A Database Publication

THE MICRO USER

Volume 5
Number 8
October 1987
£1.25

Top-selling guide to the BBC Micro!

ARCHIMEDES
The great software race is under way

CEEFAX
Capture all the news in seconds

GAME
Two-player action in Space Arena

UTILITY
Analysing loans on your micro

EDUCATION
Choosing the right software

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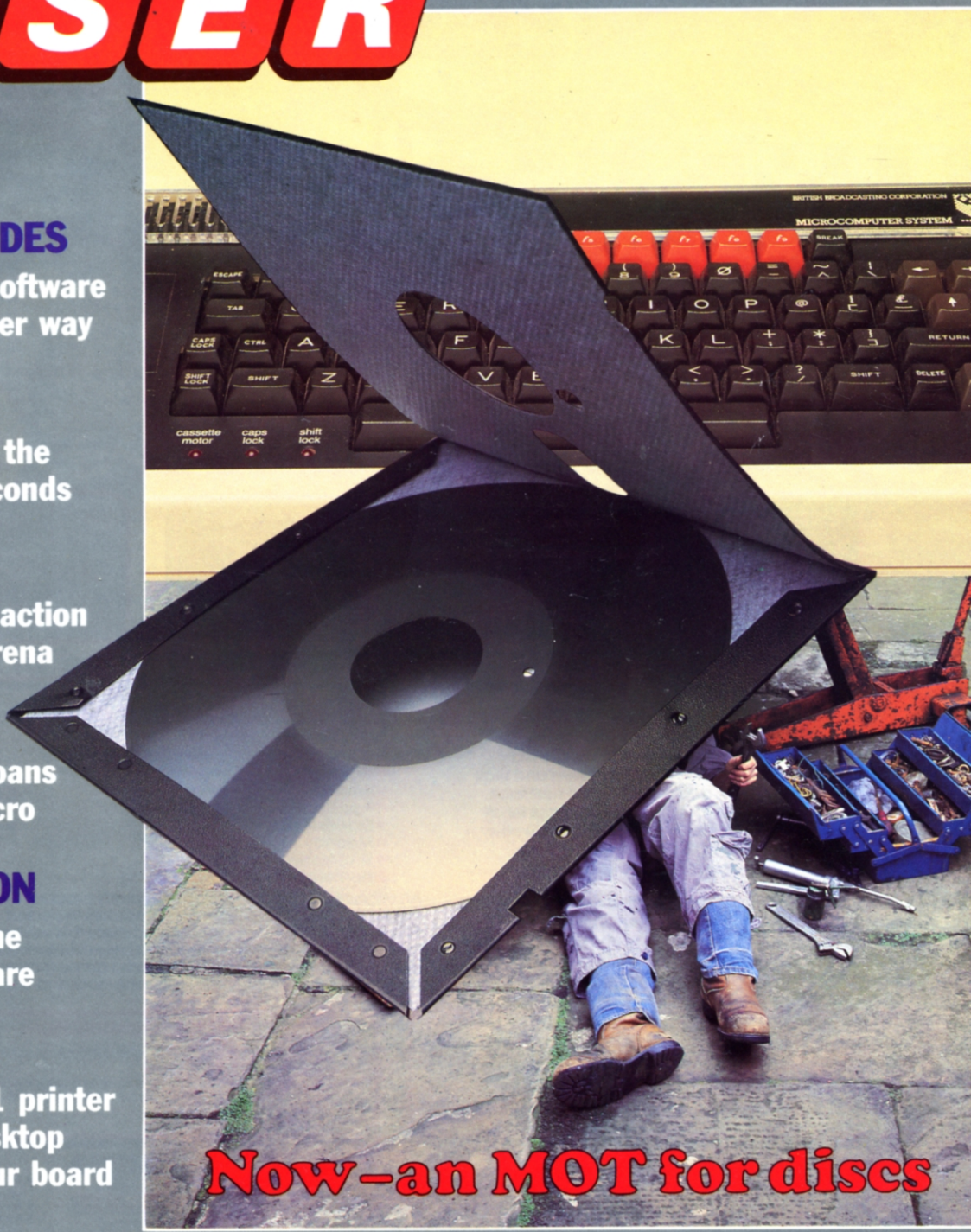
- KXP-1081 printer
- Genie desktop
- SPX colour board



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- Nurburgring (W. Germany)

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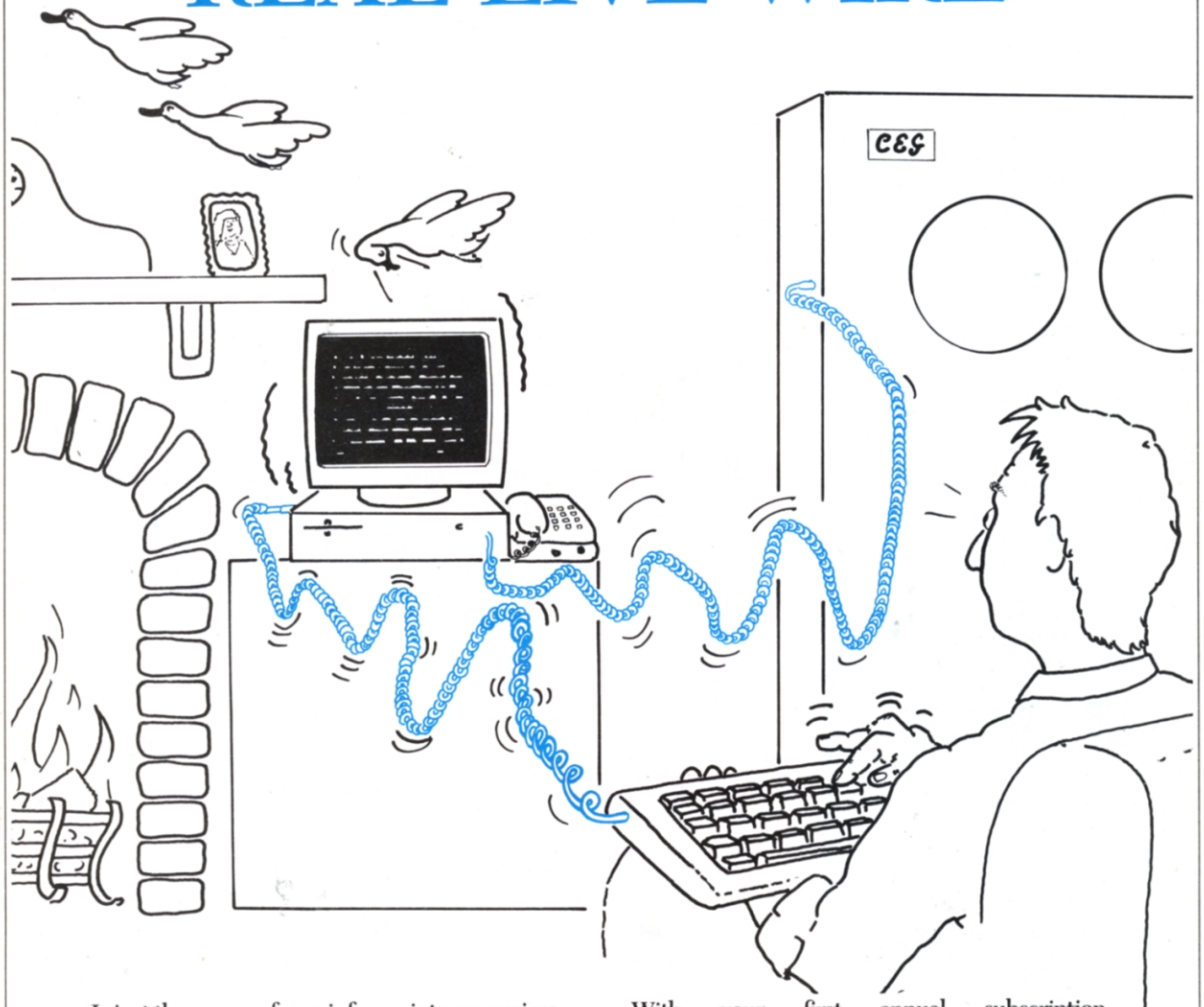

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The Micro User welcomes program listings and articles for publication. Material should be typed or computer-printed, and preferably double-spaced. Program listings should be accompanied by cassette tape or disc. Please enclose a stamped, self-addressed envelope, otherwise the return of material cannot be guaranteed. Contributions accepted for publication will be on an all-rights basis.

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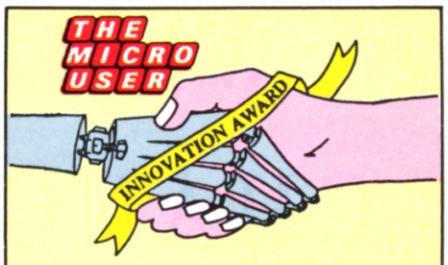

More brilliant entries have been received in our much talked-about contest. Full report starts on Page 9.

How good are you?

Extend your programming skill to enhance our superb MicroWorks program. That's all you have to do to win a prize worth over £500.
See Page 67

Save money on bargain offers from fellow readers – page 133

NEXT MONTH

GAME
Dune Hunter – arcade action

ARCHIMEDES
Zarch – the game unveiled

HARDWARE
Master Romboard 4

LANGUAGES
Three Cs compared

THE MICRO USER

November issue on sale October 7

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Easy to use, View Professional is suitable for the BBC B, B+, Master 128 and Master Compact and costs £99.95. A version for Archimedes will be available later in the year. View it now at your local Acorn dealer.

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THE MICRO USER NEWS

Michael Meakin: "Huge market"

Archimedes tops the show bill

THE Archimedes will be the top of the bill when the Electron & BBC Micro User Show returns to the New Horticultural Hall in London from November 13 to 15.

It will almost certainly provide the setting for the first public appearance of the as yet to be launched A400 series, the next stage in development of the world's fastest micro.

And it will be the launching pad for the initial wave of software for both the A300 and A400 series in the Archimedes range.

In fact, visitors will have the first opportunity to get hands-on experience of the Archimedes by playing Zarch, the search and destroy game on a scrolling 3D landscape.

"The show will provide the perfect setting for the new Acorn machines at the height of the last few weeks before Christmas", remarked one observer.

However, though the Archimedes will be very much in the limelight, it certainly won't place the BBC Micro and the Master series in the back seat. A survey of exhibitors has revealed that at least 20 companies are currently working on major new products to unveil at the show for both these machines.

But, as in the run up to previous events in the series, the firms involved are loath to reveal details in the face of fierce market competition.

Typical of these is Watford Electronics which will be offering a new range of products for both the BBC Micro and the Archimedes.

"All we are prepared to tell you at this stage is that visitors won't go away disappointed", said managing director Nazir Jessa.

A money saving advance ticket order form appears on page 15.

UK SOFTWARE DRIVE IN USA

A NEW transatlantic deal will see a British software house reverse recent trends by establishing a major presence in the United States.

Database Software has reached agreement on a joint venture with ShareData, pioneers of budget packages in the States and a public company valued at $28 million.

The result is the formation of Database Software Inc, in Phoenix, Arizona.

The new corporation aims to market the best British and European titles through ShareData's 22,000 outlets in North America.

Database Software is part of the Database Group, the UK's leading publisher of computer specific magazines including *The Micro User*.

As a software house, it first sprang to prominence in Britain in October, 1984, with the release of Mini Office – top seller on the BBC Micro.

Database Software is today recognised as one of the fastest growing companies in its field in the UK. The last 12 months have seen its turnover increase more than five times.

Similarly, ShareData in the States has a track record second to none. It has become the pacesetter for the American industry, recording sales of more than 500,000 units in the last three months.

Michael Meakin, joint managing director of Database, flew to Arizona to complete the British-American deal.

"We have spent a long time looking for a suitable partner in the States to make us a truly international company", he said. "And in ShareData we believe we have found the perfect answer.

"Now the search is on to find the hottest software properties in Europe and Britain to sell in America.

"It is a huge market with an insatiable thirst for good software", said Michael Meakin. "We intend to satisfy that demand with the help of the wealth of excellent software authors over here".

Target is India

A MIDLANDS firm is hoping to open up a big new market in India with the latest version of its word processor on BBC Micro and Master machines.

R.S. Computer Systems of Coventry (0203 23055) has already had marked success with a Paunjabi version of Shabad in schools and local authorities on the subcontinent.

Now it has perfected a Hindi version and is trying to organise deals in India.

A spokesman said that there were a variety of import regulations to overcome but they were confident that a major breakthrough could be made.

CRASH REMEDY

A WAVE of complaints about ram/rom boards which have plagued the BBC Micro market has prompted Watford Electronics to help sort out the situation.

Owners of boards that have been causing user port crashes are being offered a £10 discount when trading in for one of Watford's own 32k, 64k, or 128k ram/rom cards.

"The numerous problems reported to us concerning incompatible rom/ram boards have been creating a bad feeling in the industry and we felt that it was time to help sort out the problem", said Nazir Jessa, Watford's managing director.

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BBC MICRO

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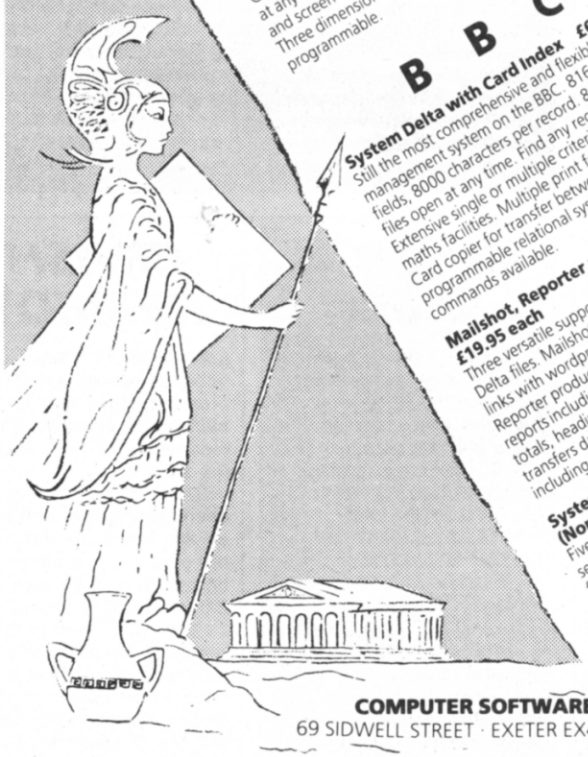

COMPUTER SOFTWARE AND SYSTEMS SPECIALISTS
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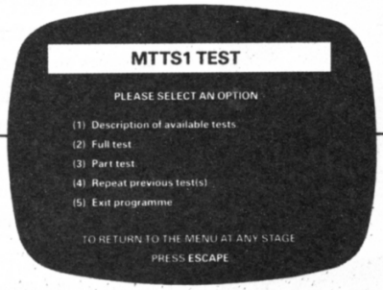
The great search for the most innovative use of a BBC Micro is gathering momentum. More than 500 entries have now been received, spurred on by the top prize – a £1,000 Archimedes, the world's fastest micro. Entries have come from all over Britain, and from users as diverse as country vicars and high powered industrialists. As such, they are a living testimony to the continuing importance of the BBC Micro in the UK today. Here, once again, is a random selection of the fascinating stories that have come to light . . .



A BBC Micro is ensuring that television sets don't fail half way through Tomorrow's World.

It is being used as the nerve centre of quality control to ensure that shoddy tellies don't emerge from British factories.

Developed by Terry Douglas, an applications engineer specialising in domestic television, it is marketed by Mullard, the electrial component manufacturer.

Recognising a need for improvement in television factory production testing, Terry turned to "the good old BBC Micro".

He has taken the Model B and turned it into an automatic tester with a system written in Basic for ease of modification.

The heart of the system is a means of converting from the resident RS423 to the two wire bus used in the TV.

With this two way communication established, the BBC Micro is able to carry out fast and accurate checks on everything from the remote control reception through to the LED displays and the teletext chip.

"The task was to give TV set makers a tool for reliably testing chassis in production and giving fault details", explained Terry.

"A BBC Micro is ideal for this task with its great ability to interface with the rest of the world".

To suit the factory environment where personnel are not necessarily familiar with micros, the Basic test program was put into eprom to boot into the rom filing system and run from switch on, thus avoiding disc drives in the factory.

Sanyo, in Suffolk, is just one manufacturer to adopt the BBC Micro system which is giving British-based industry a helping hand.

MICRO-BASED EMBROIDERY

A TEXTILE engineer based in Wales has developed a BBC Micro based alternative to commercial embroidery machines with screen input which cost well over £50,000.

David Selby of Newtown, Powys, has drawn on his experience working for Tootalls and Courtaulds to develop Sew-Easy, a package which allows actual sewing, not just designing, a pattern.

To achieve this, he uses two main peripherals – a Grafpad II for input and a conventional sewing machine – as well as a couple of stepper motors and "a few mechanical bits" like toothed belts and pulleys.

The sewing machine's feeder is removed and replaced by an embroidery holder which is moved in the X and Y directions by the two stepper motors.

Embroidery of a motif simply requires the drawing of the required shape on the screen with the Grafpad, then several versions of the software take over.

For simple outlines, the BBC Micro is called upon to calculate stitch lengths and directions – and then drive the sewing machine from the stitch file.

With more complex motifs, the outline is first drawn and then the individual stitches are plotted using the "rubber band" mode of the Grafpad.

Communication between BBC Micro and sewing machine is via the user port, using eight data lines for the stepper motors, CB1 for the stitch counting and CB2 to start and stop the sewing.

Although compared with a commercial embroidery machine, it is slow at only 250 to 300 stitches a minute, it is a lot faster than by hand – and repeatable – and much, much cheaper.

SUPERIOR SLALOMS...

CANOEIST Paul Boothroyd has turned to his BBC Micro to help him more easily negotiate the tricky slalom courses on surging rivers.

The student paddler has developed a program capable of storing the details of what obstacles can be found at competition venues.

It carefully evaluates the position of poles, the directions they must be negotiated, and the optimum speed at which they should be approached.

The BBC Micro is finally called upon to provide him with information on his mistakes – where a pole was touched or a gate missed out.

Don't forget that the closing date for entries is October 31. The winner of this prestigious award will be announced at the Electron & BBC Micro User Show, opening at the New Horticultural Hall, Westminster, on November 13.

Aid for disabled

A BBC Micro and a Master have both been brought in to help teach severely disabled adolescents with learning difficulties how to read.

The project is taking place at the Portland Training College for the disabled in Mansfield.

It is here that the staff have developed a special program known as Padread which works off a single switch.

This allows any severely disabled youngster to work through a reading skills training package almost entirely unaided.

In all, it contains some 19 sections.

The first enables the user to select the file that he or she is currently working on.

The second provides a number of options including scanning rate, reading speed, and the ability to restart from a point reached in the program during an earlier session.

The third displays a story.

All the remaining parts of the package are made up of exercises based on the story.

These include yes/no questions, true/false questions, missing words, misspelt words, word searches, a "flasher" (which displays a word on screen for a certain period of time, then asks the student what it was), hopscotch (searching for a word snaked in the middle of a maze of other letters), anagrams, word orders and alphabetical sorts.

To date the project is reported to have had a very high success rate.

Measuring up on Mars

VISITORS to the Bristol Exploratory Exhibition can now find out what their weights would be on other planets – courtesy of a BBC Micro.

Alex Wilding, a lecturer on secondment to Averys – the scales people – was asked to mastermind the project.

Originally it had been envisaged that an industrial weighing platform would be used linked to a display unit and two remote displays.

The weighing platform yields a small differential voltage (about 10mV full scale), while the "display unit" runs a 31k program, written in 8048 assembler code, to perform ranging, zeroing, linearisation, autocalibration and tare subtraction.

However, Alex Wilding had a better idea.

He decided to take the platform output to an amplifier with two op-amps to boost and level-shift for the 0V to 1.8V model B analogue input. This, with the platform, is powered by the –5V to +5V auxiliary power output.

The program displays an "invitation" screen and waits for someone to get on the platform.

It then weighs them, calculates the mass, Earth weight, and what their weight would be on other planets.

Then it presents the answers in sequence with comments. By "Mode 2 palette-bashing", an animation of a pendulum is continuously displayed, with its period altering in sympathy with the different gravities.

The program is on eprom in sideways rom, configured to load the run-code into ram on power-up and then pass control via the MOS to Basic.

"The result is a system under budget, under schedule and of superior performance", says Alex Wilding.

DESKTOP PUBLISHING AWARDS 1·9·8·7

THE search is now well under way to find the best examples of Desktop Publishing using a BBC Micro.

Desktop Publishing is the biggest growth area in microcomputing today.
It has enabled people from all walks of life – owners of small businesses to club secretaries and community groups – to become publishers in their own right.

PIRA, the UK technology centre for the printing and publishing industry, is to sponsor annual awards for the best examples of Desktop Publishing.They will be presented at the first Desktop Publishing Show to be held at the Business Design Centre in Islington, London, from October 15-17.

There will be three categories:

- *Best newspaper or magazine.*
- *Most outstanding company report.*
- *Best leaflet, newsletter or brochure.*

A special award for the best design produced on a BBC Micro is being made by Acorn. The winner will receive an Archimedes – the fastest micro in the world.

For further details phone 061-457 8383 or write to: *Desktop Publishing Awards, Europa House, 68 Chester Road, Hazel Grove, Stockport SK7 5NY*

All entries should be received by Thursday, October 1.

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BBC Cable if purchased separately is £8.00. Software on its own: £11.00 + £1 p&p.

NEWS

Desktop publishing gets a Year Book

THE world's first yearbook dedicated to the rapidly-growing desktop publishing industry is to be published in October by Database Publications.

The launch of The Desktop Publishing Yearbook is timed to coincide with the most important exhibition event in the DTP calendar – The Desktop Publishing Show 1987 – to be held at the Business Design Centre, London, from October 15 to 17.

Published with the cooperation of PIRA, the UK Technology Centre for the Printing and Publishing industry, the yearbook will become the bible of desktop publishing.

As well as comprehensive details of price-performance of all the most important hardware and software in the field, the yearbook will also carry detailed practical articles aimed at both the newcomer to DTP and the experienced user.

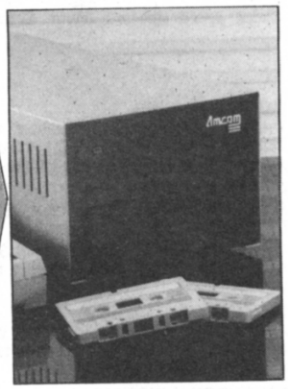
Topics covered will include single-user and multi-user systems, publishing software, laser and other printers, digitisers and scanners, computer typesetting, magazine and newspaper composition, documents and forms creation, bureau services, word processors, and many other key topics.

The yearbook will be on sale, price £5, at bookstalls throughout the country. But visitors to the Desktop Publishing Show on October 15 to 17 will receive a free copy.

AN 80Kb-a-second tape streamer to back up BBC-Micro-based hard disc drives has been launched by Amcom Software.

The 20Mb Tapestreamer is for both stand alone and E-net based Winchesters. It costs £950.

Amcom (0908 569212) has just organised a new approved dealer network and has reduced the base price of its stand alone hard disc range to £399.



THE FRIENDLY LINES

TWO utilities aimed at making the BBC Micro and Master range even more friendly have just been released by Camelot Computer Services.

The first, called The Menu, is in fact two utilities in one, designed to reside in and take advantage of the !BOOT file on discs to present a user-friendly front end to disc and rom systems. The List allows a meaningful description to be entered for each file. It produces a ready-formatted printout.

Camelot (061-494 2253) says both are written entirely in machine code, have on-screen instructions and error trapping. They are compatible with the B, B+ and Master series using 8271 or 1770 DFS. On the Master they also display date and time. Price £15.75.

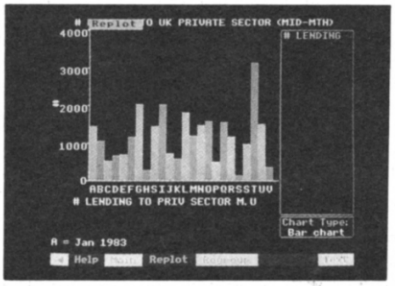
THE GALLUP CHART TOP 20 BBC SOFTWARE

THIS MONTH	LAST MONTH	TITLE (Software House)	PRICE
1	-	GRAND PRIX CONSTRUCTION SET *Superior*	9.95
2	3	AROUND THE WORLD IN 40 SCREENS *Superior*	6.95
3	6	DUNJUNZ *Bug–Byte*	2.99
4	•	CODENAME DROID *Superior*	9.95
5	2	PHANTOM *Tynesoft*	7.95
6	7	SUPERIOR COLLECTION VOL 1 *Superior*	9.95
7	8	SUPERIOR COLLECTION VOL 2 *Superior*	9.95
8	5	HERCULES *Power House*	1.99
9	4	PAPERBOY *Elite*	9.95
10	10	MICROPOWER MAGIC *Micropower*	7.95
11	15	STRYKER'S RUN *Superior*	9.95
12	11	REPTON 3 *Superior*	9.95
13	14	COMMONWEALTH GAMES *Tynesoft*	6.95
14	•	GEOFF CAPES STRONGMAN *Ricochet*	1.99
15	12	RAVENSKULL *Superior*	9.95
16	13	BIG KO *Tynesoft*	7.95
17	16	KONAMI'S COIN-OP HITS *Imagine*	9.95
18	•	SPY VS SPY *Tynesoft*	9.95
19	•	RED ARROWS *Alternative*	1.99
20	•	WINTER OLYMPICS *Tynesoft*	7.95

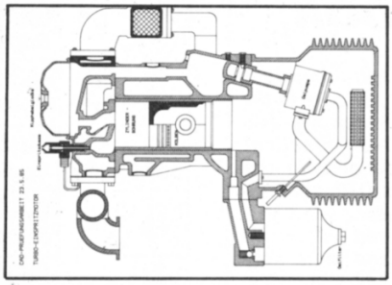
Compiled by Gallup/Microscope

Four new titles enter the chart this month, while Winter Olympics re-enters at 20. Superior demonstrate their commitment to the BBC Micro with five games in the Top 10 and with Codename Droid – Stryker's Run Part 2, entering at number four.

Every PLOTMATE picture tells a story



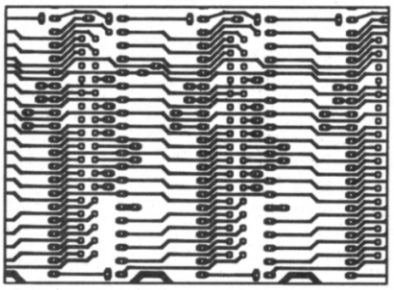
DOMESDAY
A typical bar chart from the Domesday database. Hard copy is obtainable via the Plotmate BBC Welcome disk.



CAD
Example from SUPERDRAFT running on the NIMBUS.

DIGITISING
Map of Europe digitised and edited using LINMAP software.

IMAGE SCANNING
Linscan screen file of 'MONA LISA' incorporated into AMX PAGEMAKER.



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Plotmate is compatible with all leading micros including the BBC, NIMBUS, IBM PCs and PC compatibles, such as the AMSTRAD PC1512.

CAD
Plotmate runs from many leading BBC packages including BITSTIK, AMX DESIGN, the REALTIME GRAPHICS SYSTEM and LOGOTRON LOGO. When the on-board graphics language range is extended, Plotmate 'M' models understand commands from HPGL 7475A/7470A industry standard languages enabling compatibility with a wide range of professional third party software including AUTOCAD, AUTOSKETCH, SUPERDRAFT, SCRIBE MODELLER and MICRODRAFT.

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LINTRACK is a sophisticated, low cost, CAD package which allows the creation and revision of printed circuit board artwork. BBC, Nimbus, IBM PC and Amstrad PC1512 versions available.

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AMX PAGEMAKER, FLEET STREET EDITOR, IMAGE, ARTROOM and ACE can process image files created by Linscan (for the BBC).

ALDUS PAGEMAKER and NEWSPAPER can use image files from Linscan (for the Nimbus).

GEM PAINT, XEROX VENTURA PUBLISHER, and GEM DESKTOP PUBLISHER can utilise image files created by Linscan (for IBM PCs and PC compatibles).

DOMESDAY
All Plotmate Welcome disks allow WRITE Files containing tabular data from the Domesday database to be reprocessed in pie, bar and line chart format on the BBC Master.

EDUCATIONAL DISCOUNTS
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Archimedes spawns a new world of software

By IAN BYFIELD

MORE than 50 major software houses are already busy developing new products to exploit the highly advanced features of the Archimedes.

Acorn's software support group is working closely with companies and have so far supplied more than 500 development machines to interested parties showing genuine ability and enthusiasm.

The group has found wide ranging interest in the machine around the country. None is more enthusiastic than Nova Fisher of Minerva who said she was aiming to become the largest supplier of Archimedes software.

"We have worked hard on preparing a lot of programs for the machine because we believe in it", she said.

More than 20 pieces of software from the house are either in the shops or under preparation. Out now is Deltabase, a low cost, powerful database which, like all Minerva's Archimedes software is genuine ARM programming and does not run under the emulator.

Coming soon is the maze game Minotaur and five independent accounting modules which can be linked under the System Delta Personal banner. These are order processing and invoicing; sales ledger; stock management; purchase ledger; and nominal ledger.

Also on the cards is System Delta Plus, a relational database management system. This WIMP-based package sports statistics like two billion records, 16 million fields and 24 million sub sets.

Specialist packages nearing completion include School Administrator, retail aids Video Rental and Newsagent, and Reporter, which helps generate specialist reports, works with the most common word processors and links up to Deltabase.

Minerva is claiming world firsts for a series of programs. System Gamma Plus is an innovative programmable graphics management system which has a sister program in System Gamma Plot, general graphics software. System Sigma is billed as the first programmable spreadsheet management system.

Before the end of the year, the company plans to release Ancestry for family tree preparation, Timetable for schools, Librarian for schools and small municipal libraries, and Profiling, designed to help schools provide the records on pupils required by new legislation.

It will be next spring before Minerva completes SuperDelta, which Nova Fisher describes as "the absolute ultimate in data management". Its features will include random length fields, a soundex search system which will look for words phonetically as well as by spelling to pick up typing errors. It will also have human applied language which will enable direct English statements to be entered as instructions.

Computer Concepts has turned all its attention to the Archimedes.

General manager Rob Pickering said: "All our efforts are now towards doing everything we possibly can to produce software for the machine. We are looking for freelance and staff programmers who are interested to work with the ARM chip".

The company has several major applications in hand – word processor, desktop publisher, programmable designer, spreadsheet, database and such. There are also "plans for other things".

Substantial sums of money are being put into Archimedes software development by Logotron. Technical director Christopher Roper said Logotron was employing much more sophisticated software tools and techniques for its Archimedes products. He said he believed companies who did not shift gear in this fashion would be left a long way behind.

He called on Acorn to continue and renew its efforts to support software houses so that the base could soon become large enough to aid sales of the machine.

Logotron has taken the old Logo software and enhanced it for the new machine. Said Roper: "To users it will appear like a very fast version of Logotron Logo, cleaned up a little and with much more workspace".

The company is also to release Xor, the maze game, again in an enhanced version.

Christopher Roper said that because all Logotron's software was written in assembly code, any versions for the Archimedes would easily be adaptable to take advantage of the machine's extra capabilities.

Beebug's software manager John Wallace said his company was very definitely committed to supporting the machine – but it would take some time to produce programs worthy of it.

"I believe that if software houses were to put out only BBC Micro-type software then the Archimedes would fail because its full potential of large memory and speed would not be achieved.

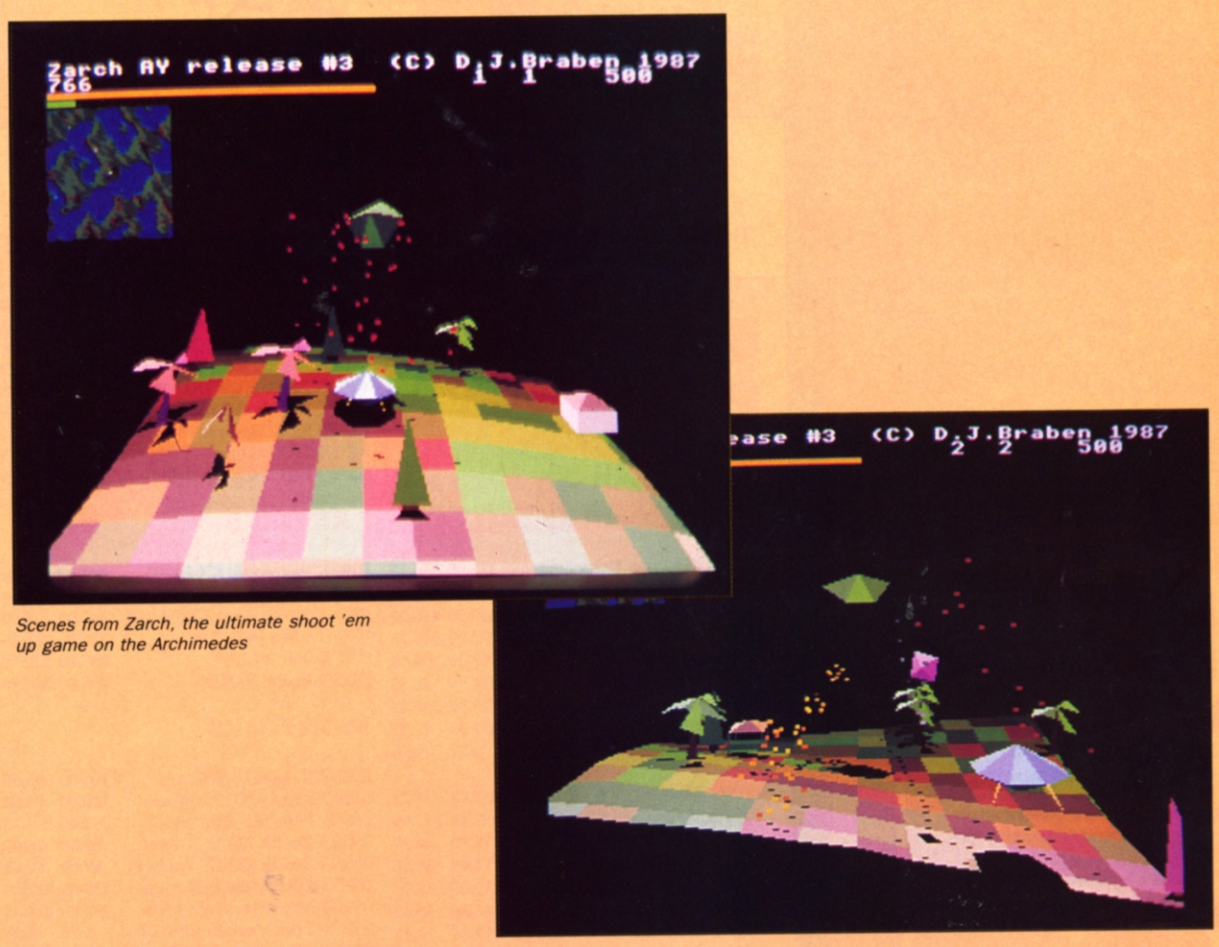
"Indeed it is rather difficult to know where to start. The Archimedes has so much potential you have to rethink the scale of your software activities".

He said Beebug had one or two projects in hand. But the first product for the machine would be an internal modem, 1200x1200, full duplex, autodial and Hayes compatibility.

Software to run on the emulator would be available immediately, but the house was working on new programs. This would be like Beebug's successful Command modem software in that it could in effect be programmed, but would take advantage of the Archimedes's extra qualities.

Clares was quick off the mark with a toolkit and an art package plus a promise of more conversions of appropriate programs from their catalogue.

The toolkit has a whole series of



Scenes from Zarch, the ultimate shoot 'em up game on the Archimedes

editors, in words, hex, text, binary, memory and disassembler, all of which can be selected by a single keystroke.

It has a sophisticated search system which can look for a variety of elements including a sequence of bytes, words, text strings – including wild cards – and mnemonics. All this can be used in conjunction with a single line assembler.

The editing and searching can all be done from floppy or hard disc.

The arts package Artisan, written by the same people who produced Fleet Street Editor and Art Room uses windows extensively and offers sprite designers, palettes and zooms.

It works in Mode 12 but appears to offer more than the usual 16 colours. This is achieved by the combination of colours on neighbouring pixels.

Superior, who produced the game supplied on the Archimedes demo disc has expanded the program into a fully fledged 3D scrolling landscape strategy shoot 'em up.

Zarch is a multi-level search and destroy game in which the player has to try to stop a landscape from being polluted by a variety of increasingly nasty craft, one of which actually mutates on contact with a particular bush to become even more venomous.

The company says it is committed to continued support for the machine and has two programmers working on games at present.

Acornsoft has a new version of View Professional for the machine. This is a highly advanced word processor which also includes a spreadsheet and database facilities.

Also on the Acornsoft label but from Grafox is a version of Logistix, the planning aid, designed to operate like a computerised wall planner.

The firm is now looking at its own catalogue and third party products for candidates to port to the new machine.

BBC Software is taking a long term view of the possiblities of the Archimedes, since most of its products are for the education field and therefore have a long shelf life.

But the company is producing a communications package which software manager Jim Day describes as "more useful to the normal user than sophisticated for the hacker".

Taking a similar angle will be a word processor designed to be extremely comfortable to use.

A bridge game program will follow and there will be a selective look at BBC Soft's catalogue to see if there is anything worth enhancing.

All the company's products not specifically for the Archimedes from now on will be compatible across the BBC computer range.

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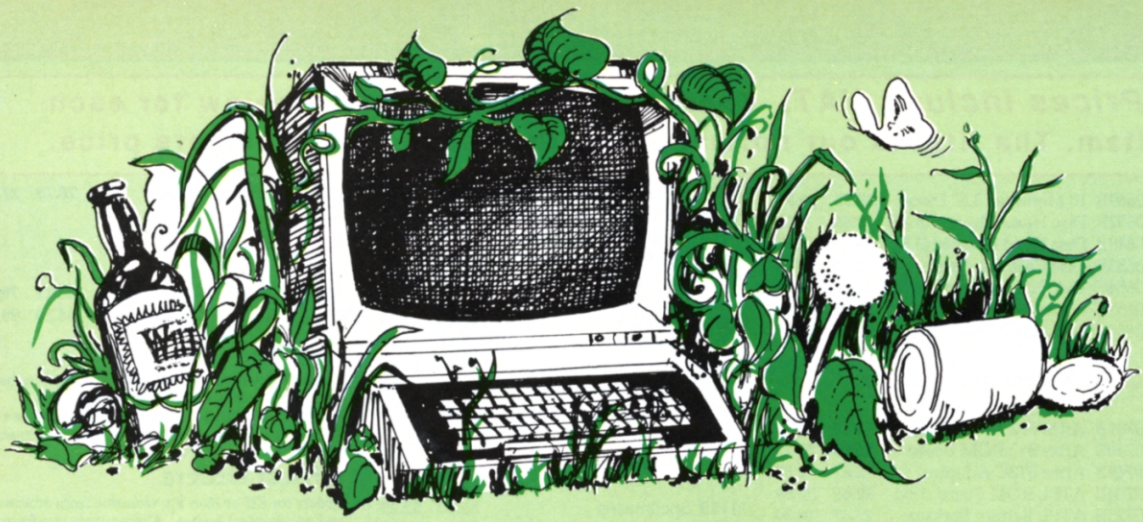

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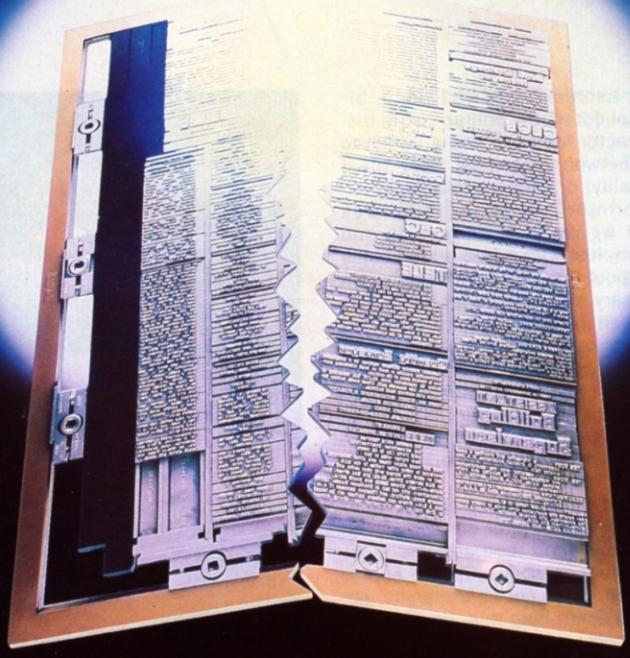

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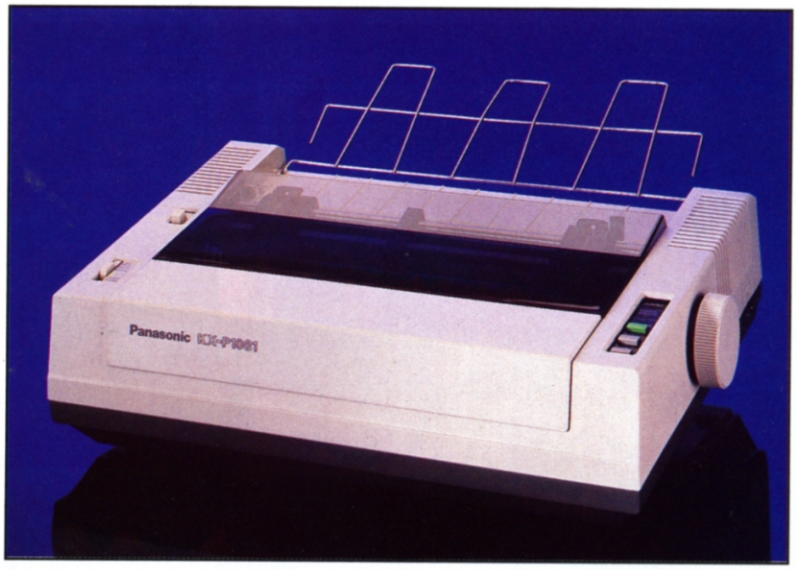
AO95

Peter Davidson puts Panasonic's KX-P1081 printer through its paces



An ideal companion

Product: KX-P1081 Panasonic Printer
Price: £178.25
Supplier: Watford Electronics, Jessa House, 250 Lower High Street, Watford WD1 2AN.
Tel: 0923 3774

THE Panasonic KX-P1081 is a bi-directional dot matrix printer that is friction or tractor feed and has a switch to choose between standard, NLQ (near letter quality) or condensed print.

The printer reviewed here was supplied by Watford Electronics and came complete with a free printer cable and Dumpout 3 rom. A screen dump rom is necessary with any printer and it was nice to open the box and find a complete printing package.

The rom was fully reviewed in the February 1985 issue of *The Micro User* so beyond saying that it certainly works well with the KX-P1080 and now has an interrupt driven screen dump I won't be receiving it here.

There are three buttons on the right-hand side of the printer controlling the online status, form feed and line feed. The feed buttons work while the printer is online so it was not necessary to use the button controlling this, unlike many other printers.

Above these switches are three small lights – power, paper/error and online. Power and online remain lit while the printer is being used and the centre one indicates things like paper-out or jammed.

The mains lead is permanently connected to the rear of the printer but needs a plug fitting. As it can't be removed, it gets in the way slightly if you move the printer, but at least you can't lose it.

The dip switches are easily accessible under a piece of plastic near the print head. Flick it out of the way and the switches can be moved without searching for a screwdriver.

Epson compatibility is a feature advertised by many printer manufacturers. But just how compatible is compatible? Figure I shows the control codes and a P or E in the left-hand column shows ones applicable to Panasonic or Epson printers only. The Epson codes shown are those for an FX80 together with the extra ones from the LX-85.

A feature I occasionally require that was not available on the Panasonic was reverse paper feed, but this was more than compensated for by all the extra ones offered over my Epson FX80. This printer has been so well accepted in the office that someone asked if another printer is Panasonic compatible.

The KX-P1081 is rated at 120 characters per second. I compared the speed with an Epson FX80 rated at 160cps and found very little difference. In NLQ mode the speed drops to 24cps so it's a good idea to check the document in draft before moving to NLQ.

In some circumstances the Panasonic is faster than the Epson. A point to bear in mind when you choose a printer is that speed is affected by things like head turn around time so the cps, while being an indication, does not give the whole story.

There is a built-in 1k buffer so a small document can be sent to the printer whole and you can continue working as it prints. Unfortunately there is no flush buffer button so if you make a mistake you have to wait while it empties or switch off.

The print head has nine pins and these are used to give a 9x9 matrix. In NLQ the matrix is 18x18. You can see from Figure I that a wide variety of typefaces and styles are available. The Figure itself was printed after sending the codes 27,33,4,27,83,1,27,65,4.

Figure II shows some of the many typefaces available and Figure III shows some NLQ text. As with all printers not all combinations of styles are available, but all the important ones such as NLQ italics are.

If the character you want is not available you can easily define your own. If you've ever defined a character on a micro you should have no problem. The horizontal and vertical lines in tables can easily be created using underline to draw across and by redefining ! (character 33) using the codes 27,121,33, 0,0,0,0,255,0,0,0,0 to give upright bars.

The NLQ feature can be implemented using the switch on the left hand side of the printer or by sending control codes. It is slower than draft because the printer outputs part of the letters, moves the paper slightly and then goes over them again to give four times the dot density. The last line of Figure III shows a line of text interrupted during the second pass of the print head.

Printing is rather noisy compared to more expensive printers, but it is acceptable. It can be quietened using the half-speed and/or single-direction printing modes, but I'd rather put up with the noise and benefit from the speed.

Fanfold paper feeds in easily but you must ensure you feed it straight in at the back otherwise it soon snarls up. There is no tear bar so you have to move forward to the next perforation to tear the paper easily.

The ribbon is a cartridge type and drops in with no problems at all. It's

claimed to last for two million characters and there's a small button at the back of the cartridge you depress once printing becomes faint. This re-inks the ribbon and allows a further one million characters to be printed.

The manual is well written and far easier to understand than many I have seen. One of the appendices gives a summary of the features available, the code required to get them (in the form, for example, ESC+S+0) and a page reference. That page translates this to 27,83,n where n=0,48,178,176. A little confusing and all the options for n don't help, but far more helpful than the more usual form that the Escape codes are given in.

Each feature has a simple example to go with it. Unfortunately, they're not written for a BBC Micro and they're not even all for the same micro. In some a simple change of LPRINT to PRINT and the addition of a *FX3,2 at the start and *FX3,4 at the end allows the demonstration to be used on a BBC Micro.

Other sample programs require the removal of the WIDTH and OPEN commands together with the #1s from the PRINTs. Add the FXs at the start and end and they work.

Overall this printer is excellent value for money. It does all the tasks you would expect of a low-cost dot matrix machine and works well with all the software I tried. It's an ideal companion to your BBC Micro.

Figure I: A wide variety of styles is available

	CHARACTER MODE	
	Cancel condensed	18
	Cancel one-line double width	20
	Set condensed	15
	Set one-line double width	14
	Set pica pitch	27,80
	Set elite pitch	27,77
	Set double width	27,87,1
	Cancel double width settings	27,87,0
	Set superscript mode	27,83,0
	Cancel sub/superscript mode	27,84
	Set subscript	27,83,1
	Set italic	27,52
	Cancel italic	27,53
	Select international set	27,82,n
	Set emphasised print	27,69
	Cancel emphasised print	27,70
	Set double printing	27,71
	Cancel double printing	27,72
	Sets underline	27,45,1
	Cancel underline	27,45,0
	Specifiy mode combination	27,33,n
P	Set NLQ (pica pitch)	27,110
P	Set NLQ (elite pitch)	27,111
P	Select character pitch	27,119,n
	Select NLQ font	27,120,1
	Select draft font	27,120,0
	Set proportional spacing	27,112,1
P	Cancel proportional spacing	27,112,0
	BIT IMAGE (GRAPHICS) MODE	
	Set single density	27,75,n1,n2
	Set double density	27,76,n1,n2
	Set double speed, density	27,89,n1,n2
	Set quadruple density	27,90,n1,n2
	Select 8-pin image mode	27,42,m,n1,n2
	Select 9-pin image mode	27,94,m,n1,n2
	Assign bit image density	27,63,n,m
	LINE SPACING	
	Line spacing 1/8"	27,48
	Line spacing 7/72"	27,49
	Line spacing 1/6"	27,50
	Line spacing n/72"	27,65,n
	Line spacing n/216"	27,51,n
	Spaces n/216" (1-line only)	27,74,n
	PAPER FEED	
	Moves to next top of form	12
	Moves paper one line	10
	Set skip perforation	27,78,n
	Cancel skip perforations	27,79
E	Reverse feed	27,106,n
	Paper feed execution	27,74,n
	PAGE FORMAT	
	Print then backspace one	8
	Executes horizontal tab	9
	Executes vetical tab	11
	Set horizontal tab	27,68,n1,...,nx,0
	Cancel horizontal tab	27,68,0
	Set horizontal tab	27,101,0,n
	Set vertical tab	27,66,n1,...nx,0
	Cancel vertical tab	27,66,0
	Set vertical tab	27,101,1,n
	Set page length in inches	27,67,0,n
	Set page length in lines	27,67,n
	Set column head (Left Margin)	27,73,n
	Set colum end (Right Margin)	27,81,n
	Skips "n" position on line	27,102,0,n
	Skips "n" lines	27,102,1,n
	WORD PROCESSING	
	Enables left alignment	27,97,0
	Enables auto centering	27,97,1
	Enables right alignment	27,97,2
	Enables auto justification	27,97,3
	DATA CONTROL	
	Clears data in buffer	24
	Deletes last character	127
	Selects printer	17
	Deselects printer	19
	DOWNLOAD CHARACTER	
P	Define download character	27,121,loc,D1,D2,..D9
P	Cancel download character	27,122,loc
	MISCELLANEOUS	
	Homes print head	27,60
	Initializes the printer	27,64
	Set half speed	27,115,1
	Releases half speed	27,115,0
P	Set single direction	27,85,1
P	Releases single direction	27,85,0
	Enables paper-end detection	27,57
	Disables paper-end detection	27,56
	E=Epson only	
	P=Panasonic only	

Here's Pica:
Italic
Emphasised
Bold
Large
Proportional

Here's Condensed:
Italic
Emphasised
Bold
Large
Proportional

Here's Elite:
Italic
Emphasised
Bold
Large
Proportional

Here's NLQ:
Italic
Emphasised
Large
Proportional

Figure II: Sample styles

This is a demonstration of NLQ printing in the Elite Typeface.

NLQ is obtained by the printer outputting part characters, moving the paper slightly and then printing the rest.

When the printer is stopped during NLQ output it looks like this.

Figure III: NLQ output

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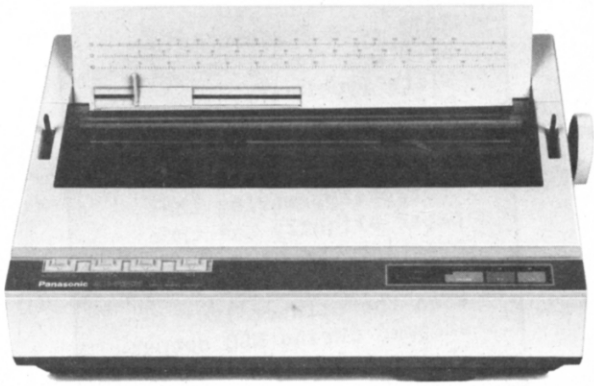

MATRIX PRINTERS: KX-P1081 (120CPS, 80 COL.), KX-P1082 (160 CPS, 80 COL.), KX-P1083 (240 CPS, 80 COL.), KX-P1592 (180 CPS, 132 COL.), KX-P1595 (240 CPS, 132 COL.).

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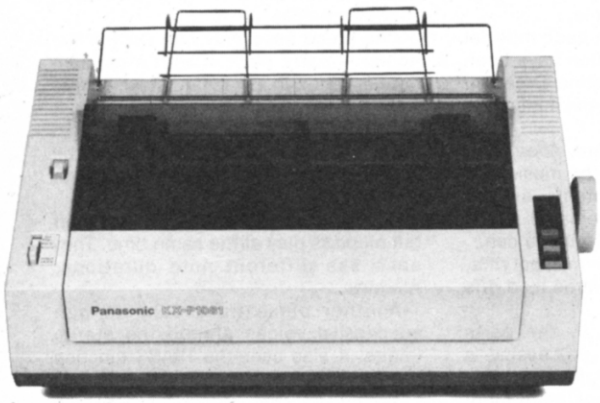

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MU9·87

Ian Waugh makes computered music with the Hybrid Music System

The Music Micro

MUSICIANS have done many strange things to music over the years in their search for new styles and forms of expression. Sound can be treated in an infinite number of ways with reverb, echo, chorus and delay effects. Sounds can be speeded up, slowed down and altered harmonically, often beyond recognition of the original sound.

These experiments have been going on for years – even before the advent of the computer. What has been less common is the processing of the actual music lines.

Terry Riley gave music processing widespread attention with his Rainbow In Curved Air and much serial music uses similar melodic lines in a variety of ways. But these ideas are by no means new and their origins can probably be traced back to simple sounds such as London's Burning and Frere Jacques.

Such processing and manipulation is usually produced manually. That is, someone has to physically play all the parts (although they may later be manipulated by signal processing equipment). In many ways this limits the intricacy and complexity of the pieces, as ultimately everything must fit exactly. A task for the computer you might think – and you'd be right.

One of Hybrid Music System's many unique features is its ability to process music with the Ample language. It can be used to enter traditional music – often quite easily and economically – but it can also be used to apply programming functions to music.

As the system gives you full control over every aspect of the finished piece, from instrument creation to the arrangement, you can effectively use the language to alter any aspect of the music.

In case this is beginning to sound like an academic discussion on music composition, fear not. The idea is not as complex as it may seem and it's quite easy to implement in Ample.

The results, too, can be quite musical and some pieces I've written have been said to sound like Tangerine Dream (*I* didn't say that) and serial and minimalist music.

The piece presented here, *Adea*, only processes one aspect of the music, the tune itself. The instruments are all predefined and the mix remains static, but do listen to it in stereo if you can.

The piece only uses four musical riffs, the bass riff – *br1* – and three lead riffs – *lr1*, *lr2* and *lr3*.

These are processed by the parts which play them and the processing is quite simple: Each part plays its allocated riff with a different instrument (*delstring* is used twice, however) and with different note durations. A series of rests is used to delay the entry of some of the parts. The piece gradually builds up until all eight parts are playing and then they fall out one by one.

The idea is quite simple, but it took a lot of trial and error to get it sounding right – the musician and his ear are still required and are, ultimately, the final judge.

The piece was originally conceived mathematically as a number of parts, each playing their riff a certain number of times, at different speeds and at different octaves.

The musical reality was not as perfect as the original mathematical model suggested (hence the tweaking) proving – to me at any rate – that although maths and music have their links, a good mathematical model does not necessarily produce good music.

If you examine the arrangement, however, you will see its underlying mathematical structure.

You can experiment quite freely with the arrangement, and here the computer has one enormous advantage over traditional recording procedures. A single part, arrangement or instrument can be altered very easily and quickly without disturbing the rest of the composition.

It would, in fact, be virtually impossible to create and edit a similar sort of piece using anything other than a MCL (Music Composition language) and a computer.

This is a simple example of how Ample can be used effectively to produce interesting and viable music.

You could also apply programming functions to the instruments and the mix so instruments change timbre and stereo position during play. The possibilities are enormous.

I've composed other pieces using variations on the above theme. I'll pass on a few of the processes I've used which will hopefully stimulate you into producing your own pieces.

One piece used only one riff (of five notes) – *part1* plays it with a medium note duration in a middle-octave range. After a delay, *part2* joins in playing it at half the speed at a lower octave. Then *part3* comes in playing it at twice the speed of *part1* and at a higher octave. Get the idea?

Another piece again uses only one riff but all parts play at the same time. They each use different note durations, however.

Another piece uses echo to pan successive voices around the stereo image. It also uses the TRANS function to transpose each echo.

You can impose random durations and delays to pieces and may like to experiment with Adea by substituting random

delays in place of the fixed delay before each part enters.

Random values can be assigned to any parameter, even notes and instrument parameters. Using random numbers and IF... ELSE constructions you can make a part play different riffs.

You can experiment with different scales – such as ethnic scales – quite easily, too. A tune can be entered in a traditional key and various key signatures applied before playing.

For example I wrote a variation on Good King Wenceslas (not long till Christmas now.) in F (one flat) and then played it with the following flattened notes: B, D and G. Then with B, E, D and G to give the piece a gypsy or eastern flavour. It's very easy in Ample to alter the key of a piece and use non-standard key signatures.

All these examples are simple to implement in Ample and I'm sure you can see how difficult – or impossible – they would be to produce using traditional music recording techniques, even with a room full of computer-driven Midi sequencers.

Adea runs on the Music 5000, or Music 500 with upgrade. A list of the words it uses is given at the top of the listing.

You can type the words and their definitions directly into the command area (press Tab after booting your system when in menu mode) using the same layout as appears in the listing, but you only need to enter the approximate number of spaces shown in the instrument definitions.

Save the program – just in case – then type RUN.

```
"RUN" []  "basstring" []  "block1" []
"br1" []  "delstring" []  "ekopipe" []
"glock" []  "info" []  "lr1" []
"lr2" []  "lr3" []  "mix" []
"part1" []  "part2" []  "part3" []
"part4" []  "part5" []  "part6" []
"part7" []  "part8" []  "phastring" []
"plink" []  "pluck" []

"RUN" [7 MODE DISPLAY
%           Adea
%            by
%         Ian  Waugh
%
%       Version  1.0
%
info "12345678"PLAY ]

"basstring" [2 CHANS
1 CHAN   ON RM
2 CHAN   1 OFFSET
EVERY CHAN
 Hollow  Slowvib    Swell
 118 AMP ]

"block1" [2 CHANS
1 CHAN  Pure    Flat   Short
2 CHAN  Hollow  Flat   Short
  128 AMP
EVERY CHAN ]

"br1" [A/// ~D/// ~E/// ~A///
~e/// ~d/// ~a/// //// ]

"delstring" [2 CHANS
1 CHAN ON RM  20 OFFSET  ON INVERT
2 CHAN 128 AMP
EVERY CHAN
 Round  Delvib Swell
  ON PHSET ]

"ekopipe" [2 CHANS
2 CHAN  183 SHIFT  128 AMP
EVERY CHAN
 Round   Delvib  Echohit
  ON PHSET ]

"glock" [2 CHANS
1 CHAN  Clear    Long    Delvib
2 CHAN  High     Flat    Short
  128 AMP
EVERY CHAN  ON PHSET ]

"info" [DISPLAY
%Only The notes A, D, E and A are used
%In this composition - hence the name
%There is one bass riff - br1 - which
%is played with different note durations
%by the first 4 parts. Parts 5 to 7 play
%combinations of the 2 sets of notes -
%lr1 lr2 lr3 - with different note
%durations. The piece builds up as each
%part enters then fades away as they
%drop out.
]

"lr1" [
'ADDaDDaD 'DaDDaDDa 'DDaDDaDD 'aDDaDDaD
'DaDDaDDa 'DDaDDaDD 'aDDaDDaD 'DaDDaDDa
'DDaDDaDD 'aDDaDDaD 'DaDDaDDa 'DDaDDaDD
]

"lr2" [
'DEEdEEdE 'EdEEdEEd 'EEdEEdEE 'dEEdEEdE
'EdEEdEEd 'EEdEEdEE 'dEEdEEdE 'EdEEdEEd
'EEdEEdEE 'dEEdEEdE 'EdEEdEEd 'EEdEEdEE
]

"lr3" [
'EAAeAAeA 'AeAAeAAe 'AAeAAeAA 'eAAeAAeA
'AeAAeAAe 'AAeAAeAA 'eAAeAAeA 'AeAAeAAe
'AAeAAeAA 'eAAeAAeA 'AeAAeAAe 'AAeAAeAA
]

"mix" [M5MIX 48,100=T 0 M5TUNE
1 SHARE 1 VOICES delstring
 1 VOICE 108 VOL 0 PAN
2 SHARE 1 VOICES basstring
 1 VOICE 108 VOL 2 PAN
3 SHARE 1 VOICES phastring
 1 VOICE 108 VOL -2 PAN
4 SHARE 1 VOICES delstring
 1 VOICE 108 VOL 0 PAN
5 SHARE 1 VOICES plink
 1 VOICE 128 VOL -1 PAN
6 SHARE 1 VOICES pluck
 1 VOICE 108 VOL 1 PAN
7 SHARE 1 VOICES block1
 1 VOICE 128 VOL -3 PAN
8 SHARE 1 VOICES ekopipe
 1 VOICE 128 VOL 3 PAN
PNUM SHARE ]

"part1" [SCORE 192, -2:
br1 -2: 3FOR(br1)FOR ^ ]

"part2" [SCORE 192, -2:
^ br1 2FOR(^///)FOR
1: 2FOR(br1)FOR ^ ]

"part3" [SCORE 192, -2:
^^ br1 4FOR(^///)FOR
1: 2FOR(br1)FOR ^ ]

"part4" [SCORE 192, -2:
^^^ br1 6FOR(^///)FOR
1: 2FOR(br1)FOR ^ ]

"part5" [SCORE 192,
8FOR(^///)FOR 12, 49=L
16FOR(2: lr1)FOR ^ ]

"part6" [SCORE 192,
10FOR(^///)FOR
3, ^^ 12, 49=L
12FOR(1: lr2)FOR ^ ]

"part7" [SCORE 192,
12FOR(^///)FOR
3, ^ 12, 49=L
8FOR(2: lr3)FOR ^ ]

"part8" [SCORE 192,
14FOR(^///)FOR
3, ^^^ 12, 49=L
4FOR(1: lr1)FOR ^ ]

"phastring" [2 CHANS
2 CHAN  100 OFFSET 128 AMP
EVERY CHAN
  Bright Delvib Swell ]

"plink" [2 CHANS
2 CHAN   100 SHIFT
EVERY CHAN
   Pure     Flat     Short
   ON RM   20 PITCH    ON PSENS ]

"pluck" [2 CHANS
1 CHAN    1 SHIFT    ON RM
2 CHAN   -1 SHIFT   128 AMP
EVERY CHAN
 Hollow  Slowvib    Percuss ]
```

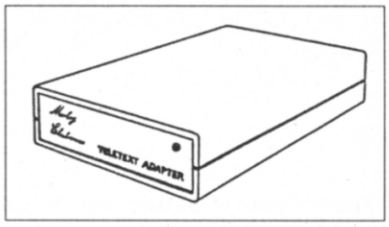
This is one of hundreds of programs available FREE for downloading on
MicroLink
In addition to these many BBC Micro programs in the MicroLink library will also run on the Electron.

This listing is included in this month's tape & disc offer. See order form on Page 141.

TELETEXT ADAPTER

Would you like access to free high quality software and over a thousand pages of information, but Prestel access charges and phone bills too expensive? Then read on!
The answer is Teletext. Yes the same system everyone has seen incorporated into television sets, but with a difference. When Teletext is read by a computer you can actually use the data.
The MORLEY TELETEXT ADAPTER introduces you to the world of Teletext at a price that won't break the bank. Inside it you will find the latest in second generation Teletext chip technology, which unlike our rivals who are still using chips designed more than ten years ago, will be fully compatible with any future advances in the Teletext system.
With the Morley adapter you will get a state of the art unit that automatically tunes itself into the required station (no more messing around with screwdrivers or twiddling little knobs in the back of the case), a user friendly menu driven program, easy to follow instructions and a 12 month warranty. Add to this the free downloadable telesoftware and we are sure that you will agree that we are offering you one of the best bargains on the market today.

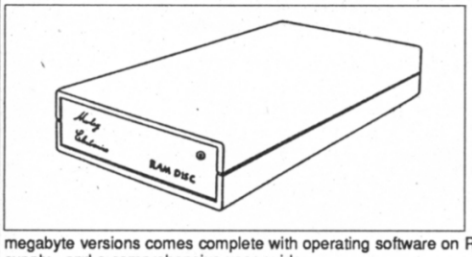
FEATURES:
* Advanced design uses the latest technology, will handle ANY future enhancements to the Teletext system e.g.: full field; 8 bit data transfer; 2k pages etc.
* Simply plugs into the user port.
* Low power consumption, less than 200ma. Optional power supply available.
* User friendly menu driven software including extended OSCLI and OSWord commands for access from BASIC programs.
* Supplied with 16k ATS (Advanced Teletext Software) and 16k support ROM software inc. printer dumps, page spoolers etc.
* FREE Telesoftware, no access charges (updated weekly).
* Save selected pages to disc/tape for later retrieval.
* Full access to all Teletext services and channels e.g.: CEEFAX, ORACLE, 4-TEL.
* Gives you a real-time clock at your disposal (*TIME).
* Software upgrades to allow for any enhancements to the Teletext service, e.g.: extra channels, full field data on cable & satellite systems etc. (only the media charge).
* Easy to follow comprehensive user guides.
* No hardware limitations, it can for example receive virtually unlimited numbers of channels.
* Utils disc available including printer drivers allows pages to be selected and dumped direct to a printer



(no more TV or Radio Times to buy).

WHAT THE REVIEWERS SAID:
". . .In terms of price, performance, future expansion possibilities and those little touches that show thought for the end user I would recommend the Morley unit."*–(Acorn User, January, 1986).*
". . .The Morley unit has been designed to ensure that its operation is simple and smooth. It is the ideal Teletext adapter for school use."*–(A&B Computing, June, 1986).*
". . .Using it over a number of months in different schools, it has proved utterly reliable, and may confidently be recommended."*–(The Times Educational Supplement, September, 1986).*
THIS IS THE BIGGEST SELLING TELETEXT ADAPTER CURRENTLY IN PRODUCTION WORLDWIDE, AND COMES WITH A FULL MONEY BACK SATISFACTION GUARANTEE.

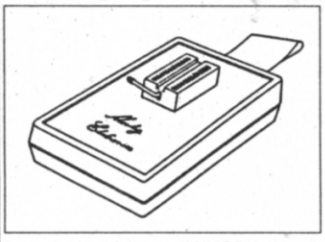
RAMDISC



Now available! The first true MEGA capacity RAMdisc for the BBC, BBC B+ and MASTER computers. This fully compatible unit, currently available in either 1 or 2 megabyte versions comes complete with operating software on ROM, power supply, and a comprehensive user guide.

FEATURES:
One megabyte of RAM connected to the 1mHz bus. Used with the supplied ROM software programs and files may be saved and loaded from the RAMdisc in the same manner as from a floppy disc with a large increase of speed, for example, a 20k mode 0 screen takes about 3-4 seconds to load from disc and about 0.2-0.3 seconds to load from the RAMdisc. The RAMdisc ROM operates as a utility ROM working with the current filing system rather than as a separate filing system. Therefore ensures compatibility with any Acorn compatible DFS (not ADFS). The RAMdisc can be selected by a * command to take the place of any drive number from 0 to 9. If the RAMdisc replaces a floppy drive as 0 for example, all commands addressed to drive 0 will be intercepted by the RAMdisc. The default drive number is 4. Any 'Dangerous' *commands such as *COMPACT, *COPY, *BACKUP etc can be intercepted and the BBC's RAM from page 2 to &7FFF saved to RAMdisc workspace, and may be recovered using a *command. This prevents accidental corruption of any programs/data in RAM you may have been using at the time. The filing system wedge ROM supplied supports load/save, byte file access, all relevant OSFSC commands, and contains a formatter verifier and 'sector' editor for use with the RAMdisc. Catalogue structure allows up to 2,688 files.
Well that's the spec., add to this our usual 12 month no quibble guarantee and we're sure you'll agree the Morley RAMdisc is the sensible alternative if increased storage capacity and speed is your requirement.

EPROM PROGRAMMER V2



The MORLEY EPROM PROGRAMMER V2 is a small self contained unit that plugs into the BBC or MASTER user port. It comes with a high quality ZIF (zero insertion force socket) and contrasting plastic case. Also included in the package is it's own user friendly menu driven software on ROM or disc.
This state of the art unit, allows programming of 2764 (8k), 27128 (16k), and 27256 (32k) EPROMS. Not only does the hardware allow programming of the usual NMOS devices, but will handle the new generation CMOS equally as well, and with the average time taken to program a 16k at less than 30 seconds we believe it to be one of the fastest programmers available today.

THE HARDWARE
The Unit is completely under software control, there are no knobs or switches to baffle the novice, and the extended features provided should excite the pro's.

THE SOFTWARE
The comprehensive user friendly software included in the package has two main parts, the first allows EPROMS to be read, programmed, verified and edited, also allowing a ROM image to be loaded or saved to disc. The second is a full ROM management system in its own right, which has a host of useful features and routines, such as KILL and RESURRECT ROM to disable or enable a sideways ROM, dump ROM image to buffer or disc, move ROM image in buffer to sideways RAM, and VIEW-SEARCH any sideways ROM.
The whole system is available now for less than the price of one WORDWISE chip. So get yourself the all new MORLEY EPROM PROGRAMMER V2 today and start using those expansion boards for what they were made for! ROMS.
Immediate delivery no quibble 12 month guarantee.

MASTER CARTRIDGE

Designed and manufactured by Care Electronics to Acorn specifications.
These high quality Master expansion cartridges will take two 16k sideways ROM's, and will, unlike similar cartridges available from other manufacturers, accept the new second generation programs, such as Computer Concepts Interword and Spellmaster ROM's.
These Cartridges come in a high quality, robust, formed-plastic case, that fits neatly into either one of the Master's cartridge slots.

MASTER SMART CARTRIDGE

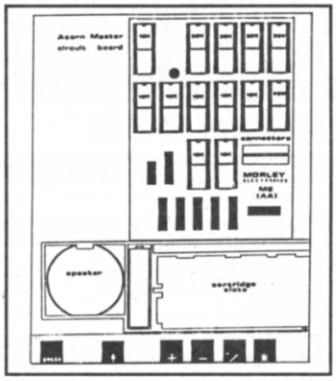
This device was designed and manufactured jointly by Morley and Care Electronics.
The **Smart** cartridge will at the press of a button halt any program running in memory and execute any one of a host of useful built in, or user defined procedures, and once completed will return to the program and continue where it left off. The only limiting factor with this device is the programmers imagination.
The **Smart** cartridge will prive useful to the novice, allowing him to do the simple things like dump any screen to printer, and make backups of protected tape or disc based software, but has an open ended specification for the advanced 'HACKER' allowing advanced programming techniques to be incorporated into almost any program at the touch of a button.

BUILT IN FEATURES (at the press of a button)
Autosaves computer's entire memory.
Freeze program at any point.
Screen dump (any mode) to printer or disc.
Allows any OSCLI command without disturbing memory.
Copies 90% of protected software.
Tape to disc, disc to tape.
User friendly menu.
Sound On/Off.

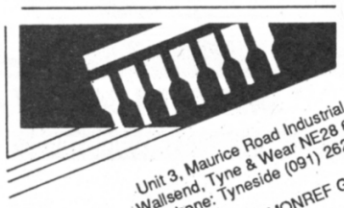
12 MONTH NO QUIBBLE WARRANTY
ALL CARTRIDGES COME WITH A

NEW*

MORLEY MASTER BOARD 'AA'



MORLEY
E·L·E·C·T·R·O·N·I·C·S



Unit 3, Maurice Road Industrial Estate, Wallsend, Tyne & Wear NE28 6BY
Telephone: Tyneside (091) 2627507

Telex: 265871 A/B MONREF G
(Quoting Mag 70211)

At long last the add-on all MASTER users have been waiting for, an internal ROM board.

No more need to turn the computer off to insert the cartridge containing the ROM you need to debug the program in memory.

The new **MORLEY MASTER BOARD "AA"** allows you to have up to 8x16k and 4x32k extra Roms installed inside your MASTER and still leaves the cartridge slots free. This in effect allows your MASTER to support as many as 24, 16k ROMs installed permanently, whilst retaining the standard 4 x sideways ram banks and four banks by using cartridges

A staggering 32 ROM images installed and accessible at any time

Included in the package is a utility ROM which has many useful features such as 'FICOPY', a clever file transfer program that transfers files between DFS and ADFS formats or vice versa.

So for less than the price of four external cartridges you get a MASTER BOARD "AA" which with twice the capacity has got to be **THE** ROM expansion for the serious MASTER user.

The unit comes with the usual Morley, full no-quibble twelve months warranty, and our usual after sales service

THE COMPLETE RANGE OF TELETEXT SOFTWARE from M/B SOFTWARE

***NEW . . . DESIGN 7 PLUS** – now 'the best' is even better. Held in high regard by reviewers and hundreds of satisfied owners, DESIGN 7 has been further improved, with revised keystrip & even more features. Design/load/save and MODE 7 screen with ease, up to full CEEFAX/Oracle standard. Will convert ANY MODE 7 screen to a BASIC procedure, for inclusion in your own programs. ROM version includes a file copier, printer dumps useable from BASIC etc. B/MASTER/COMPACT.

TELETEXT EMULATORS/SCREEN DISPLAYS/INFORMATION SYSTEMS – A complete range of teletext programs to cater for all needs, with full teletext adapter interfacing.

***NEW . . . DESFAX** – totally new version – streets ahead of the competition – run your own information/display system. Stores hundreds of screens on dual 80 track drives (96 screens on single-sided 40 track), with access to any screen with a SINGLE KEYPRESS. Lots of special effects – screens can scroll, slide, overwrite etc. Animation, loops, subroutines – send for details – not enough space here to even begin to describe the advanced features!! B/MASTER/COMPACT

***NEW . . . MASTERFAX** – 84 MODE 7 screens in memory at once. 148 screens possible with cartridge RAM. An advanced teletext/carousel program featuring SINGLE KEYPRESS or 3-digit page selection. Runs entirely from memory – no disc accesses after pages are loaded. Superb animation and other effects. MASTER/COMPACT only.

***NEW . . . VU-FAX** – 1000 screens and no disc accesses! Screens stored on MORLEY 1MByte RAM DISC. SINGLE KEYPRESS gives instant access to any screen (or emulate teletext). This is the ultimate MODE 7 screen management system – there is nothing else like it. MODEL B/MASTER 128.

***ALSO . . . MASTERcopy** – DFS/DFS, DFS/ADFS, ADFS/DFS, ADFS/ADFS file copier. Uses the MASTER 128's memory to the full to permit fast disc copying. 31 DFS files to ADFS disc in less than 2 minutes. Creates directories automatically. You will wonder how you ever managed without this program. Described by reviewers as 'unexcelled'. MASTER 128 and COMPACT's fitted with DFS ROMS.

ORDER FORM

To order simply complete and return by post enclosing your cheque/P.O. made payable to Morley Electronics, or by phone during office hours, quoting your ACCESS or VISA number.

Morley Electronics, Unit 3 Maurice Road Industrial Estate, Wallsend, Tyne & Wear NE28 6BY Telephone Tyneside (091) 2627507.
Telex: 265871 A/B MONREF G (Quoting Mag 70211)

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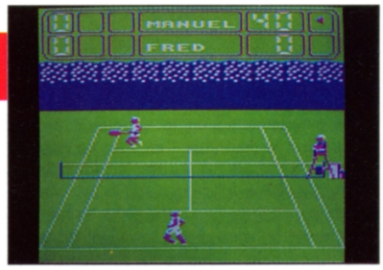
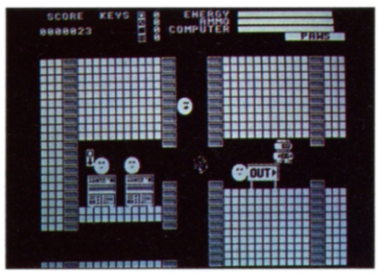
Software·S·C·E·N·E

The Bug-Byte Compilation

S	G	P	V	O
6	6	5	5	5





BUG-Byte is well known for its budget titles and this disc brings together four under the banner of The Bug-Byte Compilation.

If it's Wimbledon you pine for you may be tempted by Tennis. This one-player game lets you play over one to three sets, with four or six games per set. Viewing the court you move up to and back from the net, and from side to side – playing both attacking and defensive strokes.

Tennis is a brave attempt at portraying sporting action on the computer screen, but alas it is not that good.

Star Force Seven is a tactical game of space wars and planet colonisation. Your aim is to destroy the Zurg's home planet or capture and hold 25 other planets.

Before battle can commence you need to build a fleet of battleships, cruisers, transporters and scout ships from a fixed number of credits. Satisfied with your forces you choose a destination from one of 26 star systems and make the jump into hyperspace. While on this first journey you are prompted for a difficulty level.

The instructions tell of space battles, planetary bombardment, industrial bases and recruiting fighters. How these are implemented I cannot say as the game had a nasty habit of crashing very near the beginning.

Fly your Harrier jump-jet over a scrolling background shooting down enemy bombers before they destroy your bases – that's Skyhawk.

Graphically the game is very simple, blue sky, green grass and white bases. The animation is smooth, but the plane's response to the controls is far too erratic.

Enemy bombers fly into view from either side of the screen. Your defence of the bases is aided greatly by a small radar screen. The bombers are shown as small dots homing in on your position – by correctly judging their speed and height you can launch your first missile as they appear.

Skyhawk is a pretty reasonable game by budget standards, but don't expect too much.

Bug-Byte's Plan B is the last offering and by far the best. Your task is to guide a single combat droid through the Togrian Computer Complex wreaking havoc as you go.

Large, well-detailed sprites float through the air with the greatest of ease. It is such a pity that the control keys were not user-definable – I just couldn't get the hang of those specified.

You have only one droid so the length of the game is determined by the state of his energy cells. These are replenished by collecting spanners and oil cans.

The recent Micro Power compilations have all worked out at about £1 per game, most of which were of a similar, or higher, standard than these. On this basis I can't really recommend the Bug-Byte compilation.

Carol Barrow

Price: £7.95
Supplier: Bug-Byte, Victory House, Leicester Place, London WC2H 7NB.
Tel: 01-439 0666.

5 Computer Hits

S	G	P	V	O
6	7	7	8	7

CROAKER heads this compilation tape of five golden oldies and is similar to Frogger. Your aim is to dodge traffic on a busy road then use floating logs and turtles as stepping stones to cross a river.

Later screens become more difficult as crocodiles appear and the turtles dive. Graphics are well drawn with smooth character movement. Although the sound becomes a little monotonous it can be switched off.

The next game is Blagger, a platforms and ladders game with a burglar called, Roger the Dodger. With him you steal through 20 screens.

Unfortunately, most of the obstacles don't fit in with the scenario: Conveyor belts and disappearing platforms are fine but spaceships and railway engines are hard to explain, while giant mouths with gnashing teeth, although graphically effective, do not normally pursue even the most villainous criminal.

The sound effects are basic with the movement not always realistic resulting in Roger staying in the air for so long that Nureyev would be green with envy.

Swag is next and another game for baddies where you must collect £250,000 in diamonds before your opponent. And you are dodging bullets and killer droids all the time.

The screen shows two houses where you and your opponent hide your ill-gotten gains, and also the bank where a deposit of gold allows you a further supply of bullets.

Police cars interfere with your progress but can be stopped after a drink "that refreshes parts others can't reach" and shooting at their car.

Graphics are excellent, sound is good, and the action is very fast, for my money the best game on the tape.

Millionaire is a simulation where you are head of a software company and must make the necessary decisions on marketing, including whether to trade with Honest Harry.

The program is virtually all text, graphics being limited to a picture of the type of office you occupy, starting from a terraced house.

The questions posed are reasonably representative of the sort of decisions that are made in business but too much depends on luck.

The last item is Bug Eyes 2, a multi-screen sequel to Space Agent Zelda Meets the Bug Eyes.

In the first game, Zelda took on the might of the Xxabaneans and was captured. Your job is to search their flagship and find the 25 keys to release her while avoiding the nasties.

Sound is good, and the graphics are composed of smooth moving chunky sprites. I especially liked the way that, as you exit each screen, one of Sir Clive's C5s is waiting for you.

I rate Bug Eyes 2 and Swag as the best on this compilation and if you have neither of these it becomes excellent value. The other games tend to be a little dated and I would not buy it for them alone but they are worth having to build up your collection.

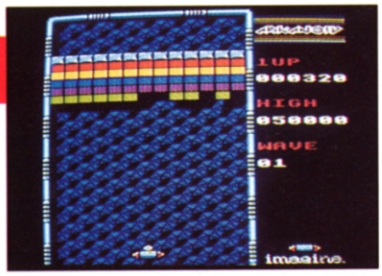
Beejay

Price: £6.95
Supplier: Beau-Jolly, 29a Bell Street, Reigate, Surrey RH2 7AD.
Tel: 0737 222003.

S: Sound
G: Graphics
P: Playability
V: Value for money
O: Overall

Arkanoid

S	G	P	V	O
9	10	10	10	10



AGEING computer hacks among you will no doubt remember Breakout from its arcade days. Using a bat you bounced a ball against a brick wall until you burst your way through. In this 1987 version, substitute spaceship for bat, throw in a few aliens and you have Arkanoid, an arcade hit from Taito.

The barriers are constructed from coloured bricks. Grey bricks must be struck twice before they disintegrate, orange ones are indestructible and are used to create simple mazes. Great accuracy is needed if you are to angle the ball – or should I say energy bolt – into the maze opening.

Barrier design is varied: Traditional rectangular shape, a wedge, a channel of indestructible bricks which zig-zags its way up the screen, and even a giant space invader. Quick thinking, or zealous use of the pause button, is essential if you are to assess a new screen's strengths and weaknesses before you lose a life.

Hyperspatial masonry is not the only problem in your battle through the void. Each screen has its complement of alien spacecraft which until level five don't fire at you. They can be destroyed with either bat or ball. Their hindrance value comes in the form of unexpected deflections and quick returns if they fly near your bat. On the plus side you will sometimes get a bounce off an alien which sends the ball through an awkward little gap.

Some of the coloured bricks contain capsules which appear when the brick in which they are trapped is destroyed. There are seven types, each a different colour and embossed with a letter. The capsule is activated by catching it on your bat. This is not as easy as it sounds as the ball is often returning at the same time.

The first capsule is labelled with an S, and slows the ball, making it easier to hit. Better still is the E capsule which expands your bat to twice its size.

C comes into its own on the screens where you are trying to fire the ball into a narrow gap as it captures the ball and holds it until you press the fire key. D stands for disruption – the ball splits into three causing incredible damage. My own favourite is the L capsule: This little baby arms your bat with twin lasers, so now you can show these aliens what real destruction is!

The B capsule is like a gift from the gods creating a hole in the wall through which you can escape to the next level.

Arkanoid has been beautifully reproduced by veteran programmer Peter Johnson for the BBC Micro.

Jon Revis

Price: £8.95 (cass) £14.95 (disc)
Supplier: Imagine, 6 Central Street, Manchester M2 5NS.
Tel: 061-832 6633

Panik

S	G	P	V	O
5	5	8	8	7

BACK in the year dot, Acornsoft brought out a game called Monsters. It was a ladders and levels game in which the aim was to make the screen hero dig holes in the levels so that the chasing monsters could fall in and be buried. This is the game that Atlantis has revived under the name of Panik.

At the start, the monsters are pink and fairly harmless. They have a limited brain and need only to be buried once. It is hard to be so cruel to these cheerful, smiling creatures, yet if they manage to climb out from your hole, a mutant red monster is created.

These are mean and fast beasts and killing them requires two holes, one directly under the other. Red monsters can metamorphose into the ultimate green variety. These devils need three vertical holes to kill them and they make the game live up to its name.

It need hardly be said that any kind of monster must be avoided. All contact is fatal.

You will also lose one of your three lives if you run out of oxygen (time) before ridding a screen of all of its nasties. On the first three screens all the monsters are pink, but on the fourth screen the red variety appears. Each screen is similar, but the number and type of monster keep the difficulty increasing.

The style of this game is decidedly dated. The screen display is simple and does not do justice to the capabilities of the micro. The sound effects are simple (but permanent) and lack the plaintive quality of the original Monsters.

The winning point for this game is the ease of use of the keyboard. Just four keys are needed: Z and X always move the hero left and right, * and ? make him go up or down ladders. If these keys are used at a point where there is no ladder, he will fill or dig holes instead.

If you've got Monsters then I couldn't really recommend Panik – the games are just too similar. If not, and you like simple, fun ladders and levels games – then Panik is a snip and worth adding to your collection.

Rog Frost

Price: £1.99. Supplier: Atlantis, 28 Station Road, London SE25 5AG. Tel: 01-771 8642

Geoff Capes – Strongman

S	G	P	V	O
7	7	8	9	7

GEOFF Capes must be one of the world's best known strongmen. Olympic shot putter and veteran of many a world's strongest man competition, he is the archetypal he-man. Strongman is a collection of six events designed to sort out the men from the boys.

The secret of success is a dedicated training regime and if you are to be a worthy successor to Geoff Capes you too must hone your body to the peak of physical fitness. To this end you are presented with an initial training session.

The lower half of the screen is devoted to five icons, each relating to a specific group of muscles. A power meter waits for you to start bashing the joystick or keyboard. You have 10 seconds to obtain the highest possible power reading. You then divide this power among the five muscle groups to determine your level of physical fitness.

Beetle rolling is the first challenge – Volkswagen Beetles. As each muscle icon flashes you must place the cursor on it and press the fire button. Make no mistakes and Geoff will begin to roll the car: Make a boob and the motor drops on his foot. Success earns extra power to rejuvenate your aching muscles.

Sumo wrestling is one of the easier events. Run at your opponent, time an upper cut correctly, and the game can be over in seconds. Get it wrong and you'll find yourself on your posterior, travelling backwards at a rate of knots.

Event number three is a fairground ring-the-bell affair. Using the muscle icons you manoeuvre the large mallet into position above the peg. Get this right and you can start pounding the keyboard to build up power in preparation for the strike.

Tug of war is one of Geoff's strongest events. The icon selection routine is again the order of the day. Next, it's time to sing the lumberjack song as Geoff lays into a mighty redwood.

Finally we have the barrel loading, which is a killer. Joystick waggling is needed to lift the barrel, followed quickly by icon selection to carry it to the truck.

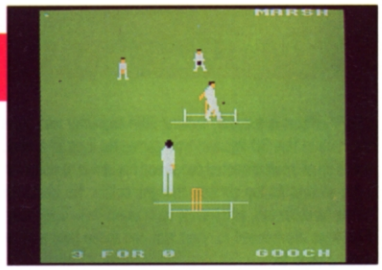
Geoff Capes – Strongman requires a good balance of speed and skill, and is excellent value for money.

Steve Brook

Price: £1.99
Supplier: Ricochet/Mastertronic, 8-10 Paul Street, London EC2A 4JH.
Tel: 01-377 8411.

Graham Gooch's Test Cricket

S	G	P	V	O
6	6	7	7	7



CRICKET is a tactical game of many subtleties which make it interesting to watch and difficult to play.

For the same reasons, trying to simulate cricket on a computer accurately would appear to be a near-impossible task. Audiogenic have made an attempt and produced Graham Gooch's Test Cricket.

The object is to win a cricket match. You can play one of three types of limited over cricket or a full two innings test match. The teams are England and Australia, but you can alter the data statements in the program to change the names of the teams and the players, together with their batting and bowling averages.

Initially you enter the team selection program which allows you to choose the teams from two squads of players. I think it would help if the lists included some information about the players for instance whether they are batsmen, bowlers, wicket keepers or all rounders.

Once the teams have been selected you decide what type of match you wish to play, whether you require a one or two-innings game and if you want the simulation or arcade mode. The simulation mode is where you just watch the game happen and occasionally chip in to change the bowlers. Next, you must choose your skill level, and who your team's wicket keeper and slip fielder will be. Be careful here. The first time I played the game I put Botham in the slips and found later that this prevented him from bowling.

If you win the toss you can bat first or put the opposing side in. Take my advice: If you get the choice, bat second – The game lasts longer that way. Bowling takes a little practice, but after a while it is possible to make some reasonable deliveries.

I found batting, on the other hand extremely difficult, even at the first skill level. The main reason is the speed of the opposition bowlers. They get through an over in less than 30 seconds.

The colour scheme is predominantly green, with some white used for the players' bodies and the crease markings. Very small amounts of yellow and black are also used. The playing screen is extremely bright and it didn't take me long to swap the colour monitor I normally use for a black and white portable television.

The view you get is from behind and slightly above the bowler. The graphics, while not anything to write home about, are adequate.

The sound is pretty awful – every time you start the bowler's run up there is an annoying beep. The other sounds are the thwack of the ball hitting the bat or pads, a slightly different thwack when the ball catches the edge of the bat and a sound like bacon frying to represent applause.

There are several ways a batsman can be out: Bowled, l.b.w., caught behind by the wicket keeper or slip fielder and caught on the boundary.

For some reason the boundary fielders drop catches nine times out of ten when I'm bowling, but never miss a catch when I'm batting. There is one other way of getting out and that is by being run out. You never actually see it happen though.

The instructions for the game are concise, easy to follow but by no means complete.

Graham Gooch's Test Cricket is a fair attempt at a cricket simulation. I just feel that it may have limited appeal. Those who don't like or don't understand cricket may find the game boring, while purists will probably think it "just isn't cricket!"

Desmond

Price: £9.95 (cass) £11.95 (disc)
Supplier: Audiogenic, 12 Chiltern Enterprise Centre, Station Road, Theale, Berkshire, RG7 4AA.

Five Star Games 2

S	G	P	V	O
8	9	10	9	9

NO compilation is complete without a shoot-'em-up game and the first item on this double cassette pack, Galaforce, is one of the best.

A space invaders-type with wave after wave of aliens intent on destruction, each one having its own attack pattern to add to your difficulty.

Some waves have motherships which release reinforcements until destroyed, while others conceal armed bombers hiding behind other craft.

Control is by keyboard or joystick and excellent sound and graphics make this a game you'll be playing after midnight.

The second game is Thrust, where you manoeuvre your spaceship over a Power Pod and activate your tractor beam before moving on to the next planet in the Empire.

Sounds easy? The catch is that the pods are guarded by an efficient planetary defence system usually located in deep tunnels.

Having eliminated the guard posts and hooked the pod, your troubles start as the pod tends to swing like a pendulum causing problems in the confined tunnels.

The game claims 72 different screens but I have only completed a few so far as they become progressively more difficult.

Karate Combat comes next, using either a joystick or a number of keys in various combinations to allow 16 different karate moves or blows.

There is a practice mode so you can tackle a target that doesn't hit back. Once you feel confident other modes allow you to tackle a friend or a computer-controlled opponent.

There are 16 of these but I've only seen one, Tushima Nakato. In every bout so far, no sooner have I straightened up from my ceremonial bow than he has knocked me into the middle of next week. But with a little more practice...

The graphics are excellent and realistic enough to satisfy even the most bloodthirsty.

The second cassette starts with Stockcar which is one or two players against a number of computer-controlled cars on a choice of six different circuits.

The game is very dated, being one of Micropower's early offerings, but it is still very playable and has been a well used item in my collection for some years.

The final game is Moon Mission, where you carry stranded astronauts through an asteroid belt to the top of the screen.

Like the previous game, although the graphics are adequate it lacks the quality of recent releases and they are obviously makeweights to the compilation.

Despite my comments on the last two games I am very impressed with this collection – any compilation containing three first class games has to be a good buy.

Beejay

Price: £9.95
Supplier: Beau Jolly, 29a Bell Street, Reigate, Surrey RH2 7AD
Tel: 0737 222003.

S: Sound
G: Graphics
P: Playability
V: Value for money
O: Overall

Crazy Er*bert

S	G	P	V	O
6	8	5	7	6

CRAZY Er*bert is a cuddly looking little character who plays the hero in this 3D Pacman-type game. He lives in a world made up of interconnected cubes and his aim is to visit each cube so that its top surface changes colour. He treats his cubes as stairways, and travels up or down them diagonally. Four keys are needed to steer him and these take a bit of getting used to.

At the start you can choose from 10 levels of difficulty and whether movement should be fast or slow. I still find the slow option is hard enough. It's an old gripe, but what a pity there is no sound-off option. The sound effects are quite adequate, but many games players need silence at times.

Er*bert does not live alone, but the other occupants of his world are all enemies. You are persistently chased by Coily Snake and Boris Gorilla. If they catch you one of your three lives is lost. Escape is provided by two elevators which return you to the surface.

If Boris or Coily try to follow, they vanish for a few vital seconds. This gives you a chance to escape, and gain some bonus points. Er*bert can also collect a Rota Hat which allows you limited flight with two extra keys required to manage the flying skills. Elevators and Rota Hats can only be used once.

To add to the problems, some unseen giant is rolling boulders down the cubes. In higher skill levels some of the cubes turn into vaporisers. These have a drastic effect on your life expectancy but fortunately they don't last long.

Also at the higher levels, Er*bert cannot manage to paint the cubes at the first attempt. You have to apply the undercoat on the first visit and a second trip is required to put on the top coat.

To score high points you can make Er*bert pick up Boris's banana. This also causes Boris to lose his temper, but you can drop the banana with a quick press of Space.

If Er*bert manages to recolour all his cubes you move to a new and more complicated screen. There are four such screens in all which means that with 10 levels and two speeds, there are 80 possible combinations.

Back in the old days of 1983, this game would have rated as amazing value at only £1.99. Now, it is merely ordinary – a game to amuse the kids for a while with its well-drawn large and colourful graphics, but lacking any real depth. Its worth buying for its compatibility with model B and Master 128 computers.

Rog Frost

Price: £1.99
Supplier: Alternative Software, Units 3-6 Bailey Gate Industrial Estate, Pontefract, West Yorkshire, WF8 2LN.
Tel: 0977 797777.

Gisburne's Castle

S	G	P	V	O
5	7	9	10	8

GISBURNE'S Castle was first released by Martech some three years ago as a full price game, and it has now been re-released at a budget price.

The aim is to steer Robin of Foxley – The Hooded Man – through Sherwood Forest and into Guy of Gisburne's heavily defended castle, to free Maid Marion who has been captured and held as bait.

This quest leads you to confrontation with the guards who take various guises but who are all dead shots with wooden beams or axes – you have to rely on your archery skills. Being hit reduces your energy, but your arrows can destroy the guards though their bodies take time to fade away and leave a clear path.

You can replenish your energy by picking up food on your way and arrows can be supplemented by collecting the quivers which have been left lying about.

The shoot-'em-up part of the game requires speed and dextrous finger work. At the same time you also have adventure-style problems to solve.

Could it be that the guards in the castle need poisoned arrows to kill them? Will the rope enable me to escape from the dungeon? Where should I throw the dynamite?

Many posers like this occur and just as in a text adventure you will have to decide which of the many objects to carry and where to leave the spare items. What ever you do, don't go in the hut until you've got the sack!

Different keys allow you to move up, down, left or right and fire arrows. You can also use keys to pick up objects when you are near them and alter the object you hold in your hand.

You can use hand held objects, or drop or throw them if preferred. There is also a mystery key which seems to have good effects sometimes, but at others proves disastrous.

This is a true arcade adventure. And while the graphic quality may not be up to present day standards, the game has many plus features.

You can define the keys and change them during a game, the sound (which is adequate) is optional, and at any time you can obtain a display of the various characters. You can also alter your opponent's skill level, to Novice, Marksman or Robin Hood.

If I attempt anything but Novice, my energy rapidly drains away to nothing.

Anti-pirate security is novel – on loading you are presented with a number. The cassette inlay has a six letter code which corresponds with the number and before playing the game you must type this in. There are 250 possible codes, and it is different each time you play, so ownership of the cassette inlay is essential.

I find Gisburne's Castle addictive and excellent value for money – for arcade adventure freaks.

Rog Frost

Price: £2.99.Supplier: Martech, Bay Terrace, Pevensey Bay, East Sussex BN24 6EE. Tel: 0323 768456

Ziggy

S	G	P	V	O
5	5	7	5	6

IS it a bird, is it a plane? No, it's a spring – Ziggy, the unlikely new star from Audiogenic. The first, I suspect, in a run of the new style of 3D arcade adventures.

The screen is laid out in a style known as oblique projection, where horizontal lines are rotated 45 degrees to the horizontal.

If you can say that while standing on your head with a disc drive between your teeth, then you're half way to getting somewhere in Ziggy, which has got to qualify as one of the trickiest games yet.

You start in fine style, with the little spring bouncing merrily around level zero collecting the crystals, one in each of the four rooms. At this stage it takes no more than a little thought to collect all four jewels.

Then it's on to the up square for the second level and beyond. Until level four it's straightforward but then things start to get hectic. Patches of glue and skulls start to get in your way and you have to increase bounce speed and distance to leap over them.

All this effort drains lifeforce at an alarming rate and if you keep it up for too long, it's curtains.

Graphically speaking, Ziggy is not very spectacluar. Although the characters are nice and chunky, the playing area is in two colours, and even though these vary from level to level, the effect is still rather drab.

Sadly it gets worse, the animation is jerky and the key response irritatingly sluggish. This is a pity because it detracts from what essentially is a very enjoyable game.

One feature I was pleased to see was a screen designer, so that even if you can't complete the 200 rooms supplied you can at least define your own. And just for a change, there's a natty little tune that won't drive you round the bend because you can turn it off.

Ziggy is the type of game that you'll either love or hate. So I strongly recommend that you try it first.

Julia Forester

Price: £7.95
Supplier: Audiogenic, 12 Chiltern Enterprise Centre, Station Road, Theale, Berkshire RG7 4AA.
Tel: 0734 303663.

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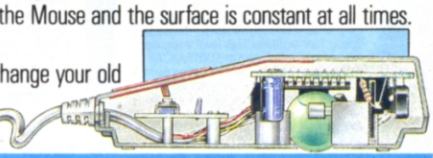

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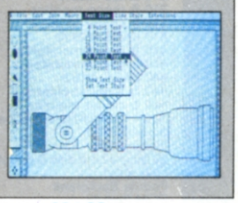

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THE 300 SERIES Consists of two models, Archimedes 305 0.5 Mbyte of RAM and Archimedes 310 with 1 Mbyte of RAM. Both machines have a 512 Kbyte ROM and a 1 Mbyte (unformatted) 3½" disc drive.

THE 400 SERIES Offers increased expansion capabilities. The Archimedes 410 has 1 Mbyte of RAM. 1 Mbyte (unformatted) 3½" disc drive, a hardware floating point unit option, a co-processor bus, a hard disk controller, a four socket back plane, 512 Kbytes of ROM. At the top of the range is Archimedes 440. This machine possesses all the features of the 410 as standard, with the adoption of 4 Mbytes of RAM and a 20 Mbyte hard disk.

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305 & mono monitor	**976.35**
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A series reference manual	**£19.95**

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The Master 512 upgrade board incorporates the Intel 80186 processor, plus 512K bytes of RAM. Digital Research DOS+, which is copatible with both MS/DOS version 2, and CP/M 86, allows you to run a large proportion of the most useful programs available. A dual 80 track disc drive is required to run programs on the 512. Provided free with 512 upgrade board are three GEM packages, GEM Desk Top, GEM Write, GEM Paint.

UNIVERSAL SECOND PROCESSOR

This allows you to connect co-processor boards designed for the Master Series to your BBC Models B or B+. Fitting a Turbo board boosts the BBC's already rapid performance to twice the speed of the standard processor. Fitting the 512 co-processor converts the BBC micro into a 16 bit machine, opening up new possibilities within the world of MS-DOS and CP/M 86. **£86.25**

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FILESTORE EO1	**£952.00**
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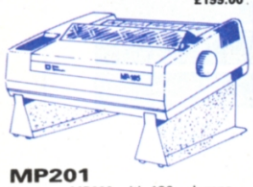

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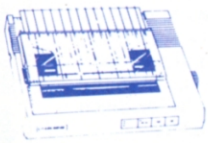

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Art

Steve Turnbull presents a powerful screen designer

HAVE you ever wanted to be creative on your BBC Micro? Perhaps to create a poster, design a page or just doodle.

Unfortunately, most art packages cost a lot of money. So as a step in the right direction and to help you decide what features you need when moving on to a more expensive package we present the MicroWorks Screen Designer.

This is quite a short program – only just over 7k – but crammed into it are a considerable number of features. Type in the listing as shown, correct any typing errors using the checksums and save the program.

You can cut out or copy the function key strip provided and slide it into position above the keys on your micro. You are now ready to run the program.

There is a short pause while the machine code is assembled and an array for sine and cosine values is initialised and you are then presented with the title screen. You can either wait for the time-out or press any key to start.

The crosshairs that are now on the screen always indicate that you are in select mode and most of the function keys will only respond while you are in this mode. The only ones that will work when using another function are load, save and cancel.

When you first run the program it is in foreground colour line drawing mode. You can change mode by pressing the appropriate function key.

To specify a point on the screen move the crosshairs using the cursor keys then press Copy. Now use the cursors again and you'll see the line or shape you've selected appearing on the screen.

There are two special cases: The triangle requires three points to be selected so the crosshairs stay on screen until the second point is selected. The polygon option puts up a question mark when you select it and you press a key for the number of sides on the polygon – three to nine.

The text option allows you to type any keyboard character on to the screen in a variety of type styles and sizes. Proportional mode allows you to alter the character pitch which is the distance between each of the characters.

When you are selecting a point you can move around the screen faster by using the Shift and Control keys in combination with the cursor keys.

To save your screen just press function key 9 and type in the name of the file. There is no error checking for valid file names, full discs and so on, so be careful.

The text is written to the screen using VDU5 and EORing so that it can be wiped out by overwriting. Loading a previously saved Mode 4 screen uses the same routine to get the filename.

As it stands MicroWorks is fairly straightforward and would be quite easy to modify perhaps with the addition of a flood fill routine or a mouse.

Mode 4 was chosen rather than Mode 5 to allow reasonable resolution and have enough memory space to include all the functions. Modification to use other modes would be quite simple and useful if you have a second processor, B+, Master or Compact. If you do change the mode most of the functions will still operate correctly although special consideration will be needed for colour selection.

So there you have it, the MicroWorks program for your works of art.

MicroWorks Function Key Strip

	f0	f1	f2	f3	f4	f5	f6	f7	f8	f9
Shift + control	Cancel action		Italic toggle	Bold/feint toggle	Inverse toggle	Proportional toggle	Decrease brush width	Decrease spray density	Text width toggle	Quit
Shift	Toggle colour	Toggle fill				Increase Increase pitch	Increase brush width	Increase spray density	Text height toggle	Load picture
Normal	Line	Dotted line	Triangle	Rectangle	Circle	Polygon	Brush	Spray	Text	Save picture

in a microcosm

```
  100 T$= "MicroWorks"
  110 A$= "S.Turnbull"
  120 REM (c) Micro User 1987
  130 ON ERROR MODE135:REPORT:PRINT" at
";ERL:END
  140 MODE4:VDU23,1,0;0;0;0;
  150 HIMEM=HIMEM-&200:PROCinit
  160 CLS:PROCtitle:CLS
  170 REPEAT PROClift:PROCkeys:G%=GET
  180 IF G%<32 PROCctrl
  190 IF G%>31 IF G%<127 PROClet
  200 IF G%>127 IF G%<138 PROCfn
  210 IF G%>143 IF G%<154 PROCs_fn
  220 IF G%>159 IF G%<170 PROCc_fn
  230 UNTIL quit:PROCquit:END
  240 DEF PROCctrl
  250 IF G%=13 PROCret
  260 ENDPROC
  270 DEF PROCret:IF ip<8 ENDPROC
  280 PROCptr(ip):px=LX%
  290 py=py-32+32*((SZ% AND2)>0)
  300 PROCptr(ip):ENDPROC
  310 DEF PROClet:IF ip<8 ENDPROC
  320 PROCptr(ip):PROCtxt(G%,0,col)
  330 PROCptr(ip):ENDPROC
  340 DEF PROCfn
  350 IF G%<137 mode=G%-128 ELSE PROCsp
  360 ENDPROC
  370 DEF PROCsp:PROCptr(ip):PROCnm
  380 IF n$>"" PROCcli("SAVE "+n$+l$+" F
FFF8000")
  390 PROCptr(ip):ENDPROC
  400 DEF PROCs_fn:IF ip>-1 ENDPROC
  410 IF G%=144 col=col EOR 1
  420 IF G%=145 fill=NOT fill
  430 IF G%=146 REM Nothing assigned
  440 IF G%=147 REM Nothing assigned
  450 IF G%=148 REM Nothing assigned
  460 IF G%=149 PT%=(PT%+1)MODmxpt
  470 IF G%=150 wdth=(wdth+1)MODmxwd
  480 IF G%=151 dens=(dens+1)MODmxdn
  490 IF G%=152 SZ%=SZ% EOR 2
  500 IF G%=153 PROClp
  510 ENDPROC
  520 DEF PROClp:PROCptr(ip):PROCnm
  530 IF n$>"" PROCcli("LOAD "+n$+l$)
  540 PROCptr(ip):ENDPROC
  550 DEF PROCnm:GCOL3,1:MOVE 24,1000
  560 VDU5:INPUT"Name:"n$:MOVE 24,1000
  570 PRINT"Name:"n$:VDU4,23,1,0;0;0;0;
  580 ENDPROC
  590 DEF PROCcli($&700):LOCALX%,Y%
  600 Y%=7:CALL&FFF7:ENDPROC
  610 DEF PROCc_fn:IF G%=160 PROCptr(ip)
:PROCunset:PROCptr(ip)
  620 IF ip>-1 ENDPROC
  630 IF G%=161 REM Nothing assigned
  640 IF G%=162 ST%=ST% EOR 1
  650 IF G%=163 ST%=ST% EOR 2
  660 IF G%=164 ST%=ST% EOR 4
  670 IF G%=165 ST%=ST% EOR 8
  680 IF G%=166 wdth=wdth-1:IF wdth=-1 w
dth=mxwd-1
  690 IF G%=167 dens=dens-1:IF dens=-1 d
ens=mxdn-1
  700 IF G%=168 SZ%=SZ% EOR 1
  710 IF G%=169 quit=TRUE
  720 ENDPROC
  730 DEF PROCinit
  740 PRINTCHR$136"Please wait...";
  750 TY%=1023:BY%=0:*FX225,128
  760 LX%=0:RX%=1279:*FX226,144
  770 bx=0:px=400:py=700:*FX227,160
  780 col=1:mode=0:unset=-1:ip=-1
  790 wdth=4:mxwd=20:dens=4:mxdn=20
  800 ST%=10:SZ%=0:PT%=0
  810 mxpt=5:fill=FALSE:l$=" FFFF5800"
  820 PROCunset:TG%=60:IG%=360/TG%
  830 VDU&FE17;&6060;&6060;&6060;&7C60;
  840 DIM d% 256,s(TG%+TG%/4)
  850 quit=FALSE:PROCassem:*FX4,2
  860 AC%=-129:CL%=-26:CR%=-122
  870 CU%=-58:CD%=-42:CC%=-106
  880 FOR A%=0 TO TG%+TG%/4
  890 s(A%)=SINRAD(IG%*A%)
  900 NEXT:K%=TRUE:ENDPROC
  910 DEF PROCtitle
  920 VDU19,0,4;0;19,1,3;0;
  930 PROCtab(T$,10,7,&A,3)
  940 PROCtab("by",18,10,9,0)
  950 PROCtab(A$,10,12,&C,1):*FX15
  960 Z%=INKEY500:ENDPROC
  970 DEF PROCtab($d%,X%,Y%,A%,B%)
  980 ?sty=A%:?siz=B%:CALL out:ENDPROC
  990 DEF PROCquit:CLS:*FX4
 1000 PROCtab(T$,4,4):ENDPROC
 1010 DEF PROCkeys
 1020 REPEAT dx=0:dy=0:*FX21
 1030 IF K% PROCptr(ip)
 1040 REPEATK%=INKEYAC%:UNTILNOTK%
 1050 IF INKEYCL% dx=-FNinc
 1060 IF INKEYCR% dx=+FNinc
 1070 IF INKEYCD% dy=-FNinc
 1080 IF INKEYCU% dy=+FNinc
 1090 IF INKEYCC% K%=TRUE
 1100 IF K% PROCptr(ip):PROCmove
 1110 UNTIL NOTK%:ENDPROC
 1120 DEF PROCmove:*FX21
 1130 IF dx=0 IF dy=0 PROCset:ENDPROC
 1140 px=px+dx:py=py+dy
 1150 IF px<LX% px=LX%ELSEIFpx>RX%px=RX%
 1160 IF py<BY% py=BY%ELSEIFpy>TY%py=TY%
 1170 ENDPROC
 1180 DEF PROCptr(P%):GCOL 3,1
 1190 IFP%=-1 PROCpcr:ENDPROC
 1200 IFP%<6 PROCmode(P%):ENDPROC
 1210 IFP%=6 PROCbrsh(wdth):ENDPROC
 1220 IFP%=7 PROCspry(dens,wdth):ENDPROC
 1230 IFP%=8 PROCmode(P%)
 1240 ENDPROC
 1250 DEF PROCpcr
 1260 MOVE px,BY%:DRAW px,TY%
 1270 MOVE LX%,py:DRAW RX%,py
 1280 ENDPROC
 1290 DEF FNinc:K%=TRUE
 1300 =4-12*INKEY-1-28*INKEY-2
 1310 DEF PROCset:K%=TRUE
 1320 IF ip=-1 PROCstart ELSE PROCform
 1330 PROClift:ENDPROC
 1340 DEF PROCstart:ip=mode
 1350 px2=px1:py2=py1:px1=px:py1=py
 1360 IF mode<>5 ENDPROC
 1370 PROCchr(ASC"?"):*FX21
 1380 sides=INSTR("3456789",GET$)+2
 1390 IF sides<3 sides=0:PROCunset
 1400 PROCchr(ASC"?"):ENDPROC
 1410 DEF PROCchr(C%):VDU5
 1420 MOVE px-16,py+32:VDUC%4
 1430 ENDPROC
```

This is one of hundreds of programs available FREE for downloading on

MicroLink

In addition to these many BBC Micro programs in the MicroLink library will also run on the Electron.

```
 1440 DEF PROCmode(M%)
 1450 IF M%=0 PROCln:ENDPROC
 1460 IF M%=1 PROCdt:ENDPROC
 1470 IF M%=2 PROCtr:ENDPROC
 1480 IF M%=3 PROCrc:ENDPROC
 1490 IF M%=4 PROCcc:ENDPROC
 1500 IF M%=5 PROCpl:ENDPROC
 1510 IF M%=6 REM Nothing assigned
 1520 IF M%=7 REM Nothing assigned
 1530 IF M%=8 PROCtx(px,py)
 1540 ENDPROC
 1550 DEF PROCform:GCOL 0,col
 1560 IF ip<8 PROCmode(ip)
 1570 PROCunset:ENDPROC
 1580 DEF PROCln:LOCAL P%:P%=5
 1590 DEF PROCdt:LOCAL P%:P%=21
 1600 PROCplot(P%):ENDPROC
 1610 DEF PROCtr:IF px2=unset ip=-1:PROC
ptr(ip):ENDPROC
 1620 IF fill PROCplot(85):ENDPROC
 1630 MOVE px2,py2:DRAW px1,py1
 1640 DRAW px,py:DRAW px2,py2:ENDPROC
 1650 DEF PROCplot(P%)
 1660 MOVE px2,py2:MOVE px1,py1
 1670 PLOT P%,px,py:ENDPROC
 1680 DEF PROCunset:px2=unset:py2=unset
 1690 IF mode>3 IF mode<6 px=px1:py=py1
 1700 px1=unset:py1=unset:ip=-1:ENDPROC
 1710 DEF PROCrc
 1720 IF fill PROCrcf ELSE PROCrcu
 1730 ENDPROC
```

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```
1740 DEF PROCrcf
1750 MOVE px1,py1:MOVE px1,py
1760 PLOT 85,px,py1:PLOT 85,px,py
1770 ENDPROC
1780 DEF PROCrcu
1790 MOVE px1,py1:DRAW px1,py
1800 DRAW px,py:DRAW px,py1
1810 DRAW px1,py1:ENDPROC
1820 DEF PROCcc
1830 LOCAL X%,Y%,R%,E%,P%,Q%
1840 IF fill P%=4:Q%=5 ELSE P%=69:Q%=69
1850 Y%=SQR((px-px1)^2+(py-py1)^2)
1860 IF Y%<4 PLOT69,px,py:ENDPROC
1870 E%=3-2*Y%:VDU29,px1;py1;
1880 IF X%<Y% REPEAT PROCdc:UNTILX%>=Y%
1890 IF X%=Y% PROCdc
1900 VDU29,0;0;:ENDPROC
1910 DEF PROCdc
1920 PLOT P%,X%,Y%:PLOT Q%,X%,-Y%
1930 PLOT P%,Y%,X%:PLOT Q%,Y%,-X%
1940 PLOT P%,-X%,Y%:PLOT Q%,-X%,-Y%
1950 PLOT P%,-Y%,X%:PLOT Q%,-Y%,-X%
1960 IF E%<0 E%=E%+4*X%+6 ELSE E%=E%+4*
(X%-Y%)+10:Y%=Y%-4
1970 X%=X%+4:ENDPROC
1980 DEF PROCplf
1990 IF fill PROCplf(sides) ELSE PROCpl
u(sides)
2000 ENDPROC
2010 DEF PROCplu(S%):LOCAL A,I,R%
2020 R%=SQR((px-px1)^2+(py-py1)^2)
2030 IF R%<4 ENDPROC
2040 I=360/S%:MOVE px1,py1+R%
2050 FOR A=0 TO 360+I STEP I
2060 DRAW px1+FNsn(A)*R%,py1+FNcs(A)*R%
2070 NEXT:ENDPROC
2080 DEF PROCplf(S%)
2090 LOCAL A,I,R%,X%,Y%
2100 R%=SQR((px-px1)^2+(py-py1)^2)
2110 IF R%<4 ENDPROC
2120 I=360/S%:X%=px1:Y%=py1+R%
2130 FOR A=0 TO 360+I STEP I
2140 MOVE X%,Y%:X%=px1+FNsn(A)*R%
2150 Y%=py1+FNcs(A)*R%:DRAW X%,Y%
2160 PLOT 85,px1,py1:NEXT:ENDPROC
2170 DEF FNsn(A%)=s((A%MOD360)DIVIG%)
2180 DEF FNcs(A%)=s(((A%+90)MOD360)DIVI
G%)
2190 DEF PROCbrsh(W%):GCOL0,col
2200 LOCAL fill:fill=TRUE
2210 px1=px:px=px+W%*4:py1=py
2220 PROCmode(4):px=px1:ENDPROC
2230 DEF PROCspry(S%,W%):GCOL0,col
2240 LOCAL A%,L%,R%,C%:IF S%=0 ENDPROC
2250 W%=W%*4:FOR L%=1 TO S%
2260 IF RND(3)=1 NEXT:ENDPROC
2270 A%=RND(360):R%=RND(W%)
2280 PLOT69,px+R%*s(A%DIVIG%),py+R%*s((
A%+90)MOD360DIVIG%)
2290 NEXT:ENDPROC
2300 DEF PROClift:IF ip<0 PROCptr(ip)
2310 REPEATUNTILINKEYAC%:IF ip<0 PROCpt
r(ip)
2320 ENDPROC
2330 DEF PROCtx(px,py)
2340 PROCtxt(254,3,col):ENDPROC
2350 DEF PROCtxt(C%,A%,B%)
2360 IF ip<>8 ENDPROC ELSE GCOLA%,B%
2370 ?sty=ST%:?siz=SZ%:d%?0=C%:d%?1=13
2380 MOVEpx,py:VDU5:CALL prnt
2390 VDU4,23,1,0;0;0;0;:px=px+FNtix
2400 ENDPROC
2410 DEF FNtix:LOCAL W%:W%=?wid
2420 IF ST% AND8 W%=W%+PT%
2430 =(W%-W%*((SZ%AND1)>0))*4
2440 DEF PROCassem:code=HIMEM
2450 chr=&4F:df1=&50:df2=&58
2460 xpo=&61:ypo=&62:idx=&63:idy=&64
2470 sty=&65:siz=&66:wid=&67:tmp=&68
2480 oswrch=&FFEE:osword=&FFF1
2490 osbyte=&FFF4:FOR L%=0 TO 2 STEP 2
2500 P%=code:[OPT L%
2510 .out STX xpo:STY ypo
2520  LDX d%:CPX #13:BNE ppp:RTS
2530 .ppp JSR posn:.prnt
2540  LDA siz:AND #15:CMP #0:BEQ nrm
2550  CMP #2:BEQ dbh:CMP #3:BEQ qd
2560  JMP dbw:.nrm LDX #&FF:STX idx
2570 .nrm1 INC idx:LDX idx
2580  LDA d%,X:CMP #13:BEQ nrmx
```

```
100 = D1CA A
110 = 6CB5 5
120 =    0 5
130 = C136 5
140 = 2C9A 1
150 = 4EFA F
160 = 1063 D
170 = 5170 8
180 = 4D7A 1
190 = 6BC8 C
200 = A941 8
210 = B6AE 0
220 = A267 B
230 = 9461 6
240 = E06E C
250 = 13AD 9
260 = ED0F 5
270 = 5A77 E
280 = E7F1 C
290 = 20FF 4
300 = C19E B
310 = 7DB1 5
320 = CD78 B
330 = C19E 1
340 = 8000 D
350 = 6C7F 9
360 = ED0F 6
370 = 9AD0 C
380 = E11C B
390 = C19E B
400 = 2C90 1
410 = AD18 F
420 = 76CD A
430 = DA08 5
440 = E939 A
450 = F907 2
460 = CE0D B
470 = 234D F
480 = 4663 A
490 = E8CC D
500 = F0E9 2
510 = ED0F A
520 = 8B88 8
530 = AA9A C
540 = C19E A
550 = 4CD8 9
560 = 82D2 1
570 = 2476 8
580 = ED0F 5
590 = E7E2 C
600 = 50E0 7
610 = A011 8
620 = 84EC B
630 = 2DFF 7
640 = EC5B A
650 = 995B 7
660 = 3395 8
670 = B77A B
680 = 247A 1
690 =  B82 0
700 = D490 5
710 = EA85 F
720 = ED0F F
730 = 40D7 6
740 = F759 9
750 = 95DD B
760 = A8C1 E
770 = 3ABA 2
780 = 8C81 7
790 = D89C 6
800 = 755F B
810 = 66EA 7
820 = 3CB3 C
830 = CCEF 7
840 = 917C 7
850 = 7A39 8
860 = 38AC 2
870 = F612 E
880 = 39BB 0
890 =  1E0 A
900 = 7C9F F
910 = 5C22 2
920 = 51E2 B
930 = 8608 0
940 = 3EFC C
950 = 75F4 C
960 = CE83 8
970 = 5452 5
980 = 5CBF 4
990 = AF04 0
1000 = B3A9 C
1010 = 2EDA C
1020 =  69B 4
1030 = F287 9
1040 = 50E4 3
1050 = AE33 9
1060 = 65F1 5
1070 = B4DC E
1080 = F42D F
1090 = 288B B
1100 = C451 3
1110 = 4B31 E
1120 =  B27 A
1130 = 7635 B
1140 = B452 A
1150 = B69A B
1160 = 1876 4
1170 = ED0F 1
1180 = B98E 9
1190 =  6AF A
1200 = 96F2 B
1210 = 122B 2
1220 =  3A1 8
1230 = C043 2
1240 = ED0F 9
1250 = 48C2 B
1260 = C670 8
1270 = 1BF3 8
1280 = ED0F 8
1290 = D87B 3
1300 = 2304 0
1310 = BBF6 C
1320 = 1C40 9
1330 = D7F2 4
1340 = FE86 D
1350 = 4DB2 8
1360 = 27D6 8
1370 = E5BB E
1380 = C2F5 B
1390 = CFD9 7
1400 = 2045 4
1410 = 88BC 5
1420 = 892C F
1430 = ED0F E
1440 = 78F5 A
1450 =  752 5
1460 = BE52 8
1470 = CFD7 D
1480 = 247C 8
1490 = 502B A
1500 = 4400 1
1510 = 8313 0
1520 = B022 8
1530 = 4798 D
1540 = ED0F D
1550 = C099 2
1560 =  28E C
1570 = F50C 7
1580 = C8A7 3
1590 = 61E9 E
1600 = A897 9
1610 = 208B F
1620 =  E3B 4
1630 = 3CAA C
1640 = 8CAD A
1650 = A73C 5
1660 = E5EC 9
1670 = 9495 B
1680 = 94B0 B
1690 = 88E9 F
1700 = 10A1 2
1710 = 9E1A 4
1720 = 28AE D
1730 = ED0F 5
1740 = 7417 7
1750 = 6744 F
1760 = E8C7 C
1770 = ED0F 1
1780 = 5645 C
1790 = E9ED 3
1800 = 94F6 B
1810 = A936 F
1820 = AE58 5
1830 = D71C C
1840 = 1F0F B
1850 = E0F1 5
1860 = 7AF6 3
1870 = 6A2B 7
1880 = 787E 6
1890 = E0FE B
1900 = 39CE 1
1910 = 37CF 0
1920 = 520A B
1930 = 4F18 7
1940 = 8AC9 D
1950 = A295 0
1960 = 2EF4 6
1970 = C4D9 1
1980 =  997 7
1990 = 949F E
2000 = ED0F 4
2010 = B3CF C
2020 = 746B 5
2030 = 98B7 E
2040 = F960 2
2050 = BA90 8
2060 = 298B 0
2070 = E531 D
2080 = 12DC B
2090 = D19A 7
2100 = 746B D
2110 = 98B7 3
2120 = 2C49 A
2130 = BA90 B
2140 =  120 F
2150 = F8B1 6
2160 = 1ABB E
2170 = CC96 2
2180 = FEF8 4
2190 = 5494 0
2200 = F917 A
2210 = B0D7 8
2220 = D982 9
2230 = B049 A
2240 = 517F D
2250 = AE49 D
2260 = 138F B
2270 = A3F4 1
2280 = 24A4 9
2290 = E531 8
2300 = C39E 5
2310 = F419 2
2320 = ED0F 1
2330 = 838D 6
2340 = FAF3 E
2350 = 8E49 A
2360 = 4DDC E
2370 = FAC1 C
2380 = D6E9 B
2390 =  3BF 9
2400 = ED0F 4
2410 = AAB1 8
2420 =  A18 2
2430 = EC05 6
2440 = CC0C C
2450 = 4247 6
2460 =  2D7 D
2470 = E789 7
2480 = 6BA1 D
2490 = DE82 4
2500 = 7CBB 2
2510 = ACD8 C
2520 = 1C7B E
2530 = FFEB 8
2540 = 56CF F
2550 = 1207 0
2560 = 8013 B
2570 = 8957 C
2580 = 1FFC 8
2590 = 1BB7 A
2600 = 5F8C 1
2610 = F137 4
2620 = 825D A
2630 = 664C 7
2640 = 59DF C
2650 = 87C3 7
2660 = 6B50 4
2670 = 5C2E 2
2680 = 3F13 3
2690 = 2F7B 5
2700 = D527 2
2710 =  857 C
2720 = 3066 9
2730 = 8F5A 3
2740 = EC91 F
2750 = 20A9 B
2760 = 50D0 0
2770 = A3C5 3
2780 = B827 3
2790 =  3EB 9
2800 = AC63 1
2810 = 27E0 3
2820 = 6697 D
2830 = 20BE 9
2840 = 1217 E
2850 = A695 F
2860 = 7C1E 8
2870 = 4CAA 8
2880 = DFBA A
2890 = 7AAB 6
2900 = E9BB E
2910 = 4830 1
2920 = 9FE4 1
2930 = 7FE6 8
2940 = 6B50 8
2950 = EE1F 9
2960 = 25A2 5
2970 = 9091 6
2980 = 9BBB F
2990 = 90F6 C
3000 = 5B10 1
3010 = 4D41 E
3020 = 4D41 5
3030 = 4D41 4
3040 = 4D41 F
3050 = 274A 7
3060 = 4D7E C
3070 = 4079 3
3080 = 2B82 F
3090 = BFA2 3
3100 = D042 D
3110 = 701C 2
3120 = 4675 4
3130 = 8063 7
3140 = 9F5A 6
3150 = D9E0 8
3160 = 7C15 5
3170 = 7972 E
3180 = 690B 1
3190 = 6FA4 1
3200 = DFB1 A
3210 = C15C 4
3220 = 99E4 B
3230 = 85D3 0
3240 = 35D4 1
3250 = AC46 6
3260 = CC93 4
3270 = 2365 0
3280 = F789 5
3290 = 6619 A
3300 = 5643 6
3310 = 12C3 A
3320 = 217F 9
3330 = 98C4 1
3340 = 558B D
3350 =  D5D 9
3360 = 339B 7
3370 = E079 8
3380 = 1D30 5
3390 =  EC7 B
3400 = ED2A 3
3410 = EBBE 0
3420 = 83A4 2
3430 = 584D C
3440 = 1849 7
3450 = FA79 A
3460 = 953B A
```

```
2590  JSR gdef:LDX #7
2600 .nm LDA df1,X:STA df2,X
2610  DEX:BPL nm:JSR pdef:JMP nrm1
2620 .nrmx RTS
2630 .qd LDX #&FF:STX idx
2640 .qd1 INC idx:LDX idx
2650  LDA d%,X:CMP #13:BEQ qdx
2660  JSR gdef:LDX #0
2670 .qd2 LDA df1,X:JSR dwd:PHA
2680  INX:CPX #8:BNE qd2
2690  JSR def21:JSR pdh:LDX #7
2700 .qd3 PLA:JSR dwd:DEX:BPL qd3
2710  JSR def21:JSR pdh:JMP qd1
2720 .qdx RTS
2730 .def21 LDX #7
2740 .d21 LDA df2,X:STA df1,X
2750  DEX:BPL d21:RTS
2760 .dbh LDX #&FF:STX idx
2770 .dhl1 INC idx:LDX idx
2780  LDA d%,X:CMP #13:BEQ dh1x
2790  JSR gdef:JSR pdh:JMP dhl1
2800 .dh1x RTS
2810 .pdh LDY #0:JSR dhd
2820  LDA #8:JSR oswrch
2830  LDA #10:JSR oswrch
2840  LDY #4:JSR dhd
2850  LDA #11:JSR oswrch:RTS
2860 .dhd
2870  LDA df1+0,Y:STA df2+0:STAdf2+1
2880  LDA df1+1,Y:STA df2+2:STAdf2+3
2890  LDA df1+2,Y:STA df2+4:STAdf2+5
2900  LDA df1+3,Y:STA df2+6:STAdf2+7
2910  JMP pdef:.dbw LDX #&FF:STX idx
2920 .dbl1 INC idx:LDX idx
2930  LDA d%,X:CMP #13:BEQ db1x
2940  JSR gdef:LDX #0
2950 .dbl2 LDA df1,X:JSR dwd
2960  PHA:INX:CPX #8:BNE dbl2
2970  JSR pdef:DEX
2980 .dbl3 PLA:JSR dwd:DEX:BPL dbl3
2990  JSR pdef:JMP dbl1
3000 .db1x RTS:.dwd
3010  ROLA:PHP:ROLdf2,X:PLP:ROLdf2,X
3020  ROLA:PHP:ROLdf2,X:PLP:ROLdf2,X
3030  ROLA:PHP:ROLdf2,X:PLP:ROLdf2,X
3040  ROLA:PHP:ROLdf2,X:PLP:ROLdf2,X
3050  RTS:.posn PHA:LDA #31:JSR oswrch
3060  LDA xpo:JSR oswrch
3070  LDA ypo:JSR oswrch:PLA:RTS
3080 .gdef STA chr
3090  LDX #chr MOD256:LDY #chr DIV256
3100  LDA #10:JSR osword
3110  LDA chr:CMP #32:BEQ prop
3120  LDX #7:LDA #0:.slop0
3130  ORA df1,X:DEX:BPL slop0
3140  TAX:STA tmp:BMI chg
3150 .slop1 LDA #0:STA tmp:LDX #7
3160 .slop2 LDA df1,X:ASL A
3170  STA df1,X:ORA tmp:STA tmp
3180  DEX:BPL slop2:BIT tmp:BPL slop1
3190 .chg LDA sty:AND #1:BEQ fein
3200 .ital CLC:ROR df1:ROR df1
3210  CLC:ROR df1+1:ROR df1+1
3220  CLC:ROR df1+2:ROR df1+3
3230 .fein LDA sty:AND #2
3240  BEQ invt:LDX #7
3250 .fl LDA df1,X:ASL A
3260  AND df1,X:STA df1,X:DEX:BPL fl
3270 .invt LDA sty:AND #4
3280  BEQ prop:LDX #7
3290 .iv LDA df1,X:EOR #&FF
3300  STA df1,X:DEX:BPL iv
3310 .prop LDA #8:STA wid
3320  AND sty:BEQ gdxx
3330  LDA chr:CMP #32:BNE nspc
3340  LDA #4:BNE gdx
3350 .nspc LDX #7:LDA #0
3360 .prlp1 ORA df1,X:DEX
3370  BPL prlp1:LDX #8
3380 .prlp2 ROR A:BCS prlp3
3390  DEX:BNE prlp2:.prlp3 TXA
3400 .gdx STA wid:.gdxx RTS
3410 .pdef LDA #23:JSR oswrch
3420  LDA #255:JSR oswrch:LDY #0
3430 .pdl LDA df2,Y:JSR oswrch
3440  INY:CPY #8:BNE pdl
3450  LDA #255:JSR oswrch:RTS
3460 ]:NEXT:ENDPROC
```

This listing is included in this month's tape & disc offer. See order form on Page 141.

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ADE+

Features

- Runs on BBC B, B+, Master, Compact, ADFS, DFS, ANFS, NFS
- Full use of all available RAM
- Intelligent memory management unit (MMU)
- User switches on all main features
- Automatic search for macros on disc
- Assemble absolute or relocatable code
- Source program tokenised or full text
- REPEAT..UNTIL, WHILE..WEND etc. high level language constructs
- Macros nestable to any depth
- Excellent error diagnostics
- Linker
- Editor and symbolic disassembler provided

ADE+

Versions and prices

Recommended for Master Compact...
ADE+ MMU and 65C00 series assembler on disc (3.5" ADFS). 32K sideways RAM required.
£42.00 + vat

Recommended for BBC B, B+ ...
ADE+ MMU and 65C00 series assembler on 2 16K EPROMS with DFS 5.25" utilities disc.
£46.00 + vat

Recommended for Master 128, turbo...
ADE+ MMU and 65C00 series assembler on EPROM cartridge with 5.25" DFS utility disc.
£49.00 + vat

Upgrade
ADE to ADE+ (upgrade to either disc, EPROM or cartridge, you must send in ADE ROM chip)
£27.00 + vat

Upgrade
ASM to ADE+ (upgrade to either disc, EPROM or cartridge, you must send in ASM ROM chip)
£35.00 + vat

Please add £1.25 P&P per unit.

ADE+

The Ultimate Assembly Language Development Tool

ADE+ is a 65C00 series assembler system supporting all the mnemonics of the 65C12 used in the latest BBC microcomputers plus the additional 'Rockwell' instructions. ADE+ is fast, faster in fact than the in-built BASIC assembler and all rival products that we have tested. The assembler produces absolute code that can be *RUN or linker modules that can be merged with the output from other programs using the ADE+ linker. ADE+ supports a powerful linker which drastically cuts assembly time; a feature normally only found on minis and mainframes. The linker will even link the output from compilers with your assembly language programs. Full library support for both the linker and the assembler is provided - fast searching for unknown instructions in a random access macro library. ADE+ is a modular system with many modules to add later; i.e. a mouse based editor & a Z80 cross assembler! A print spooling system uses sideways RAM as a print buffer to eliminate waiting time; your listing runs off as a background job! Use the print spooler from BASIC or your own programs. ADE+ uses ALL available memory. With a second processor attached the IO processor spare memory is used as a buffer to reduce the amount of disc access. All available memory is handled by ADE+'s intelligent memory management module. Use your own favourite editor or the one provided. Assemble from disc or memory. Full utilities including librarians, converter for BBC BASIC etc. ADE+ must be *the* bargain of 1986/7!

A comparison of three 65C12 assemblers

Feature	ADE +	BBC Basic	MACROM
Number of pseudo-ops	64	4	36
Use of all available RAM	Yes	No	No
Macros	Yes	No	Yes
Relocatable output	Yes	No	No
Linker with libraries	Yes	No	No
High level constructs	Yes	Yes	No
Number of error reports	39+warnings	3+BASIC errs	20
65C00 extended opcodes	All	65C12 only	65C12 only
Switch off 65C12 opcodes	Yes	No	No
ROM size	32K	16K	16K
Disassembler	Yes	No	Yes
Label restrictions	No	Yes	Yes

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Monday to Friday, 8.30am to 5.30pm

ARCHIMEDES:

A-305 basic with 0.5MB of RAM ..... **£799 + VAT**
A-310 basic with 1.0 MB of RAM ..... **£875 + VAT**
A-305 model 3 with 1.5 MB of RAM ..... **£919 + VAT**
A-305 model 4 with 2.0 MB of RAM ..... **£1039 + VAT**
A-305 model 5 with 2.5 MB of RAM ..... **£1045 + VAT**
A-305 model 6 with 4.0 MB of RAM ..... **£1245 + VAT**

WITH 1.5 MB OF RAM!

Complete **ARCHIMEDES** 305 systems with a unique choice of RAM size, disc drives and monitor to fit your requirements.
— 6 possible RAM sizes: from 0.5 MB to 4 MB.
— 3 possible disc drive systems: single 3.5", twin 3.5" or one 3.5" and one 5.25" drives.
— 3 monitors: 12" green, 14" Acorn colour or 14" NEC Multisync high resolution colour monitor.
The Archimedes A-305 is a big feature micro with a huge potential. Our package prices for any complete Archimedes system (computer, drive and monitor) are the best around. The picture on the left shows a typical system comprising the A-305 upgraded to 1.5 MB of RAM, 3.5" drive, Acorn 14" colour monitor, mouse and free software. Price: only **£1,086 + VAT (£1,249 inclusive).**
Data sheets on the Architedes range are available on request.

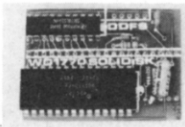
It's Easy To Masterise Your Beeb

With Solidisk Add-Ons!

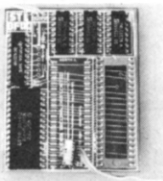
The Master wins over the BEEB on the provision of the Advanced Disc Filing System (ADFS), a Real Time clock, more memory and two internal co-processors.
Your BEEB can now gain those features and even beat the MASTER on the same ground with Solidisk add-ons. They are intelligently designed to use a minimum number of components, to occupy a minimum space inside the BEEB, to work together and with Acorn peripherals.
We work hard to keep prices low, so that it's much cheaper to upgrade your BEEB than exchanging it for a MASTER. As your BEEB retains its original features (such as an 8271), it can run more software too!

If you want to know more, Ask for the data sheets!

WD-1770 DFS:
The new Acorn Disc Filing Systems DFS and ADFS require both the WD-1770 chip. Solidisk offers two basic WD-1770 models which are totally compatible with the Acorn DFS/ADFS ROMs. We also offer our own DFS 2.2 and ADFS 2.1 ROMs which have a superset of utilities and commands. Data sheets on these ROMs are available on request.
1) WD-1770 DUAL DENSITY DISC INTERFACE for previously tape based BEEB. This is the standard Acorn disc upgrade since 1985. Prices are:
WD-1770 DDFS without DFS ROM ..... **£35.00 inc.**
WD-1770 DDFS with DFS 2.2 ROM ..... **£45.00 inc.**
WD-1770 DDFS with ADFS 2.1 ROM set ..... **£55.00 inc.**
Data sheet available on request.
2) WD-1770+8271 (DFDC) DISC INTERFACE: for BEEB already equipped with the 8271. This system allows you to keep the existing 8271 disc interface while adding the new WD-1770 chip. It has a simple switch to allow changing between the 8271 and the WD-1770. To operate the hardware, you will need either the latest ROMs from Acorn (8271 DNFS 1.2, 1770 DNFS and 1770 ADFS) or Soidisk ROMs. If you are stuck with old or inappropriate DFS software, buy the inexpensive DFS 2.2 ROM. Prices are:
DFDC without DFS ROM ..... **£45.00 inc.**
DFDC with DFS 2.2 ROM ..... **£50.00 inc.**
DFDC with ADFS 2.1 ROM set ..... **£55.00 inc.**
DFDC with 2.2 and 2.1 set (3 ROMs) ..... **£63.00 inc.**
Data sheet available on request.

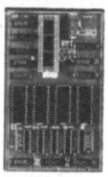


WD-1770 DFS



WD-1770 + 8271

SOLIDISK TWOMEG 128K:
The new style TWOMEG 128K memory combines Sideways RAM, four EPROM sockets and Shadow RAM on a single board, running at the same 2MHz speed at the BEEB. As you can imagine from the picture, it's unobstrusive and very easy to fit, just drop in and go. It's the ideal memory upgrade for all BEEBs. With plenty of ROM sockets (4 on the motherboard and 4 on the TWOMEG board) and 128K of additional RAM, it beats the MASTER hands down. We supply five software discs to support this excellent product. Price **£60.00 inc.**



TWO MEG 128

SOLIDISK FOURMEG 32K UP TO 256K:
SPEED, Sideways RAM, shadow RAM and 4 or 5 H/C ROM sockets are combined on the features laden Solidisk FOURMEG series. All FOURMEG boards have a 4MHz GTE 65C02 CPU as standard, same as on the Acorn TURBO co-processor. The new CPU can run BASIC 4 (and many other languages) at twice the speed of the MASTER or the COMPACT.
Its performance is comparable to a MASTER fitted with the TURBO board (costing a great deal more). New reduced prices:
FOURMEG 32K, 32K RAM, 5 H/C ROM sockets, software support on disc ..... **£60.00 inc.**
Additional 32K RAM chip, optional, each ..... **£15.00 inc.**
FOURMEG 256K, 256K RAM, 4 H/C ROM sockets, software support on disc, new low price **£100.00 inc.**
Software support disc, volumes 2 to 15, each ..... **£2.00 inc.**
Please specify 40 or 80 track disc formats.
Data sheet available on request.

REDUCED!

SOLIDISK REAL TIME CLOCK:
The Real Time Clock can be plugged into any ROM socket on the BEEB motherboard with absolutely no wire attached. The Real Time Clock provides battery-backed TIME function (even usable with BASIC 4) and *CONFIGURE. Price **£29.00 inc.**
Data sheet available on request.

SIDEWAYS-RAM BOARDS:
Sideways RAM can be used to load ROM images into the BEEB, make a printer buffer, store data and programs etc. Sideways RAM are additional memory to the basic 32K of the BEEB. To date, more than 50,000 BEEBs have been fitted with Solidisk Sideways RAM.
SWR32, 32K Sideways RAM + software disc No 1 ..... **£20.00 inc.**
SWR64, 64K Sideways RAM, two H/C EPROM sockets + software disc No 1 ..... **£30.00 inc.**
96K extension to SWR32 ..... **£25.00 inc.**
SWR128 new style, 128K Sideways RAM, 2 H/C EPROM sockets + software disc No 1 ..... **£45.00 inc.**
Software discs from 2 to 15, each ..... **£2.00 inc.**
Please specify 40 or 80 track disc format.
Data sheet available on request.

SPECIAL OFFERS!

ELECTRON EFS: LAST FEW!
This excellent product combines a disc interface with DFS and ADFS, Solidisk Winchester port and 16K Sideways RAM. Price **£50.00 inc.**

LAST FEW!

SOLIDISK TECHNOLOGY LIMITED, 17 SWEYNE AVENUE, SOUTHEND

Address:
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Southend.
Mail order and Services:
17 Sweyne Avenue,
Southend SS2 6JQ

Telephone:
Shop and showroom:
Southend (0702) 616 818
Mail order:
Southend (0702) 354 674
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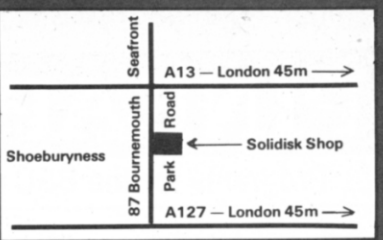
(0702) 43 11 22



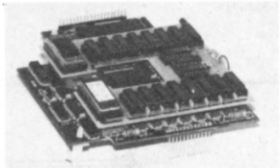
MASTER:

Our typical MASTER systems comprise the MASTER with 128K RAM, wordprocessor, spreadsheet, ADFS 2.1 cartridge and choice of drives and monitors.
A — twin 3.5" drives.
B — twin 5.25 drives.
C — one 3.5" and one 5.25" drive.
The price of the complete system depends on the choice of monitor:
– *without monitor:* **£640.00**
— with 12" *green or amber monitor* **£730.00**
– *with 14" colour (Philips CM8833 or Acorn) monitor* **£840.00**
Free demo disc with each system.
Data sheet available on request.

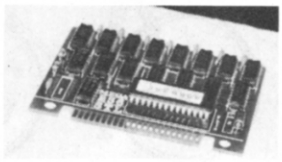
COMPACT:

Our Master Compact systems comprise the COMPACT with 128K RAM, CDFS 2.1 ROM, the same choice of disc drives as with our MASTER systems and choice of monitor.
– *with TV modulator* .... **£499 inc.**
– *with 12" green Acorn monitor* ..... **£599 inc.**
– *with 14" colour Acorn monitor* ..... **£759 inc.**
Free demo disc with each system.

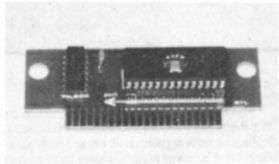
THE PC-500:
The PC-500 is just what you need to take advantage of the biggest software investment on earth: PC software, PC public domain and PC shareware.
The PC-500 is the Acorn 80186 internal co-processor for the MASTER adapted by Solidisk with an appropriate lead for use on the BEEB (and the Master).
It has a mouse, 512K of RAM, 10MHz — 16 bit CPU (around 3 times the speed of the normal PC), 4 software discs containing the Digital GEM operating system, a wordprocessor, a painting program, CPM emulator and other utilities.
Price: **£239 inclusive.** Your BEEB must have a WD-1770 and ADFS.
Data sheet available on request.



THE PC-PLUS:
The PC-PLUS is an expanded PC-500, with one Megabyte of RAM instead of 512K. The extra memory allows large applications such as Desk Top Publishing (eg Fleet Street Editor) to be used on the BEEB or the MASTER.
The PC-PLUS is supplied with the same accessories as the PC-500 including the mouse and 4 discs. Price **£339 inc.**
Upgrade from an existing Acorn 80186 costs **£119.00** but you will be required to sign a service agreement. Please ring for details.
Data sheet available on request.



TURBO-BEEB:
The TURBO-BEEB plugs directly into the TUBE connector of your BEEB and consists of the Acorn TURBO 64K, 4MHz 65C02 internal co-processor for the MASTER adapted by Solidisk with an appropriate lead for use on the BEEB (and the Master), like the PC-500. Price **£135.00 inc.**
Data sheet available on request.



MASTER MEGA CARD:
The MEGA CARD (256K) plugs into a cartridge slot on the MASTER and adds instantly 256K of RAM. The card can be used as RAMDISK, printer buffer or sideways RAM. Price **£100.00 inc.**
Data sheet available on request.

MASTER ROM CARTRIDGE:
Our MASTER ROM CARTRIDGES can accommodate all software EPROM/ROM useable on the MASTER. They are small enough to be kept permanently inside the computer if you wish. Thus capable of accommodating bulky ROMs such as Interword and Interbase or protecting your ROM from being 'borrowed'. Price **£4.00** without plastic case, **£5.00** with plastic case. Prices start as low as **£1** each for large quantities.

SPECIAL DRIVE LEADS:
We have 3 different DRIVE SPECIAL LEAD SETS to accommodate two 3.5" drives or two 5.25" drives or one of each. Each set comprises a special data lead and a special power lead.
BEEB or MASTER **£15.00**
COMPACT **£17.00**
ARCHIMEDES **£16.00**

IMPORTANT NOTICE ON TRADE UP:
Solidisk will accept return of STL memory board up to one YEAR old for TRADING UP. The selling price (below) is the price we sell at the time of the trade-up transaction. In all cases, the minimum balance must be at least £25.00 inclusive of VAT.

Age	Trade-up allowance
Up to 3 months	90% of selling price
Up to 6 months	75% of selling price
Up to 12 months	50% of selling price

BEST PRICE PROMISE:
We guarantee that our prices on selected systems are THE BEST and to prove it, we promise you that if you find the same system sold cheaper by any other officially listed Acorn dealer within ten days of your purchase, we will refund you the difference. Our PRICE PROMISE does not affect your statutory rights.

MASTERPLAN:
If you are thinking of exchanging your BEEB for a MASTER or an ARCHIMEDES, Solidisk MASTERPLAN is for you. We can quote immediately over the phone the buy-back value of your BEEB and the balance on your new system. So please give us a try!

ORDERING BY POST:
All items can be ordered by post, sending the coupon below and enclosing cheques, POs, drafts or credit card numbers or by phone. P and P is charged as follows:
Less than 1 KG (eg software, cartridges and books): **£2.00**
Up to 3 KGs (eg single disc drives): **£3.00**
Up to 10 KGs (eg computer, monitors, printers, twin disc drives): you can specify either parcel post £6.00 or courrier/Datapost: **£12.00.**
Above 10 KGs (eg complete system), please either allow generously or give us a ring for quotation.

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Name: .....
Address: .....
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Items: .....
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Price: .....
P&P: £2/£3/£6/£12
Total: .....
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PINEAPPLE SOFTWARE

Programs for the BBC model B, B+, Master and Master Compact with disc drive

DIAGRAM II

Diagram II represents a major breakthrough in the techniques used for drawing software on the BBC micro. It works on a completely different principle to other drawing software by storing the drawing information straight to disc as coded 8*8 pixel blocks.

This technique has three major advantages. First, the size of the diagram is only limited by the amount of space on disc. Second, there is no limit to the amount of information which can be stored on a given diagram as the information is stored on disc and not in computer memory. Third, the disc storage technique allows the smooth scrolling of the screen over the whole surface of the diagram.

For people not familiar with Diagram, the basic operation of the program is to first display any part of the diagram, either by quoting an index name or screen number. At this point you are free to scroll the diagram around the screen using either cursor keys, trackerball or mouse. You may stop scrolling at any point and enter the edit mode which allows you to modify or add new information to the diagram. When you have finished making alterations, the new information is stored to disc and you are free to scroll elsewhere on the diagram stopping to edit any any time.

The edit features are now very comprehensive. Text may be typed straight from the keyboard, and if other fonts are stored as user defined characters then these fonts may be printed using the normal keyboard keys.

The print routines are now completely 'scaleable' with both the horizontal and vertical scales being totally variable in 1% steps between a size that will give 18 mode 0 screens on an A4 sheet and a size that would print just one pixel on a sheet! The routines are adaptable to most types of dot matrix printer and full advantage may be made of wide carriage printers. The printouts may be rotated through 90 deg. if required.

The new editing features make DIAGRAM II suitable for all types of serious drawing application including scale drawings, flow charts, architectural, family trees, and many other subjects as well as circuit and schematic diagrams. As an example of what Diagram II can do, this complete advertisement (with the exception of the PCB drawing) has been produced with the package.

SUMMARY of DIAGRAM II FEATURES

1. Works on any model BBC computer with either DFS or ADFS, (ADFS only if Shadow memory available).
2. Will automatically take advantage of shadow memory (any make) to provide more User Definable Characters, 880 with Shadow, 381 without Shadow.
3. Rapid horizontal and vertical line drawing routine with automatic joins for circuit diagrams.
4. Full rubber band line drawing and circle drawing modes.
5. Takes advantage of the Acorn GXR rom to provide drawing of arcs, sectors, chords, parallelograms, ellipses, and flood filling. Note this rom is already fitted to Master and Compact machines.
6. Pixel cursor drawing and deleting mode allows very fine detail to be added.
7. Defined areas of screen may be moved, copied, deleted or saved to disc.
8. On-screen indication of cursor position shows either the cursor position on the overall diagram or the distance from a preset point.
9. Keyboard keys may be predefined to print User Defined Characters, enabling new character sets to be stored as user defined characters and then printed straight to the screen using the keyboard keys.
10. Wordprocessor files may be loaded to the screen and automatically formatted into any shape screen area.
11. Index names may be set up to point to given areas of a large diagram, to enable rapid access to a given point on a diagram.
12. Fully compatible with Marconi trackerball and most makes of mouse.
13. All Diagram 'Utilities' are included, enabling screen ident numbers and borders to be added, and any area of diagram to be moved or copied. The whole diagram may be displayed in reduced scale (either 4*4 or 8*8 format) on a single screen, and the size of the overall diagram may be increased or decreased.
14. Completely scaleable print routines allow any area of the diagram to be printed either horizontally or through 90 deg. in scales that may be varied in 1% steps allowing up to 18 mode 0 screens to be printed on an A4 sheet (still with readable text).
15. Complete with 40 page easy to understand handbook.

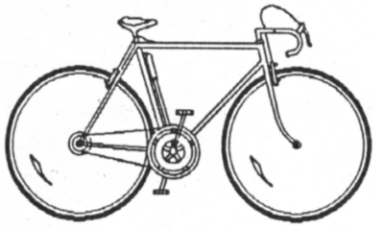


Diagram II consists of a set of disc files and a 16k Eprom. The disc supplied is formatted in 40T on side 0 and 80T on side 2. Please state if this is unsuitable for your system, or if you require a 3.5" Master Compact disc.

DIAGRAM II - £55.00 + VAT

P&P free (except overseas)

N.B. Upgrades are available to existing Diagram owners. Please contact Pineapple if you have not received an upgrade letter.

PCB

Pineapple's now famous printed circuit board draughting aid produces complex double sided PCB's very rapidly using any model BBC micro and any FX compatible dot-matrix printer.

The program is supplied on Eprom and up to 500 component and 500 ASCII component descriptions may be stored for each PCB. There is no limit to the number of tracks that may be stored for a given PCB although the maximum board size is restricted to 8" * 5.6".

Using a mode 1 screen, tracks on the top side of the board are shown in red, while those on the underside are blue. Each side of the board may be shown individually or superimposed. A component placement screen allows component outlines to be drawn for silk screen purposes and component numbers and outlines entered on this screen may be displayed during track routing to aid identification of roundels.

The print routines allow separate printouts of each side of the PCB in a very accurate expanded definition 1:1 or 2:1 scale enabling direct contact printing to be used on resist covered copper clad board. The print routines are very fast taking typically 5 minutes for a 1:1 print of a 7" * 5" board.

This program has too many superb features to describe adequately here, so please write or 'phone for more information and sample printouts.

PRICE £85.00 + VAT

MARCONI TRACKERBALL

This high quality device comes in three versions. Version one is for the standard BBC micro and comes with the Icon Artmaster drawing package from Micro-Draw, and Trackerball Utilities which allow the trackerball to be used with other software.

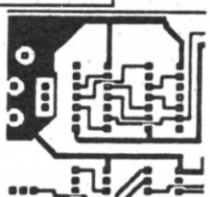
Version two is for the Master 128 computer and this comes with the Pointer Rom. This is a Rom which allows the Master to be configured for use with the Trackerball and has commands to enable the Trackerball to intercept the cursor key or joystick routines of other software. Commands are also available to reverse the axes of the trackerball and set the sensitivity. The three buttons may also be set up to produce any ASCII code.

Version three is simply the bare Trackerball which comes without software but is suitable for use with specially written software such as Diagram or Diagram II.

Trackerball adapters are also available which plug onto the end of the cable and convert the connections of the trackerball to be the same as a mouse. This enables the trackerball to drive all types of 'mouse' software.

For Model 'B' and B+ (with Icon Artmaster)	£60.00 + VAT
For Master 128 (with Pointer Rom)	£60.00 +VAT
Bare Trackerball (no software)	£49.00 + VAT
Pointer Rom - available seperately	£12.50 + VAT
Trackerball to mouse adapters	£8.00 + VAT
Postage & packing on Trackerballs	£1.75

All orders sent by return



PCB PLOTTER DRIVER

A new addition to the PCB software is the PCB plotter driver program. This enables files produced by PCB to be used in conjunction with most types of plotter to produce plotted output rather than the normal dot-matrix printer output.

In this way plots may be produced directly onto film or even directly onto copper board with an etch resistant pen if a suitable plotter is available. The program is suitable for use with most makes of plotter including Hewlett Packard, Hitachi and Plotmate M. The program can also be configured to work with other plotters by entering suitable plotter instructions.

All the features of the printer driver are included, such as the automatic thinning down of tracks between roundels. Mirror image plots are also available.

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Miteyspice is a very powerful AC & DC circuit analysis package with graphics suitable for use with any model BBC micro including those with 2nd processors.

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Beam it down the port, Scotty

Steve Gold explains the basics of serial port communication

"BEFORE dialling to the online service, ensure that DTE is connected to DCE with the RS232 cable provided. The speeds supported include 300/300, 1200/75 and 2400 baud. Your serial port should be enabled for 8:N:1 – check whether you are using software or hardware flow control..."

Does this sound familiar? What is all this mumbo-jumbo about DTE, DCE, baud rates and flow control? Is it something out of the latest Star Trek film or the Advanced BBC Micro programmers manual Volume II?

As you've probably guessed, it's neither. It's all to do with getting your BBC Micro to communicate with other computers or devices via its serial port, called the RS423 on the BBC range of micros.

RS*423*? Hold it, doesn't the first paragraph of this article mention an RS*232* interface? Correct, BBC Micros have a reduced, but not disabled, number of RS232 connections. A typical RS232 port has 25 connections, not all of which are used at any one time.

Because of cost constraints when the BBC Micro was first launched, coupled with a sensible desire to reduce the complexity of the BBC's serial port, an RS423 (as it it is technically known) was used. It has five connections, all of which are required when communicating with another device.

To understand how a serial port works, let's think of a railway. No, seriously, railways have been around for more than a century. Yet when you think of the number of motor accidents today, rarely does a train ever derail or crash. This is not due to pure luck, but is thanks to a sensible set of signals used by British Rail.

In the early days, the signals were simply painted pieces of metal that were either raised or lowered to indicate a go or no-go situation on a piece of track. More recently, traffic light systems have come into play, but the essence of the signal is still the same – an indication that it is clear or not clear to proceed.

Imagine, if you will, a single railway track with a station at either end. The train runs from one end of the track to the other and back again. This is called a simplex or half-duplex link. In serial port terms, data can flow in one direction or the other, but not in both directions at once.

Most railway lines today have two tracks, so that data can flow in both directions simultaneously. Both tracks are, for the main part, separate, so that trains may pass – at will – in one direction on each side of the track. In serial port terms, data can flow in both directions at the same time. This is known as a full duplex link.

A single wire link, with data flowing – by arrangement in either direction, but in only one direction at a given time – is a simplex or half duplex link.

A two wire link, with data flowing in both directions at the same time is a full duplex link. The interface is called *serial* because each bit of data is passed down the single wire in a series.

So, for full-duplex tranmissions. we need two wires – one to transmit (Tx), the other to receive (Rx) data. If life were that simple, things would be great. But we live in a complex world, full of electrical interference, so an earth return, known as a signal ground is required.

Data can flow at high speeds between computer equipment but, as most BBC Micro owners will know, data is actually processed by the computer as it arrives, requiring the flow of data to be temporarily stopped.

In data terms, this is known as flow control. Referring back to the first paragraph of this article, you'll note that flow control can be implemented in either hardware or software. Referring to our train signal analogy, the railway signals represent the flow control signals on a serial port connection.

In hardware flow control two further links over and above the Tx, Rx and signal ground links, are used. These are known as RTS (Request to Send) and CTS (Clear to Send). As the name implies, the RTS link allows the BBC Micro to transmit an RTS signal to a device over a serial link, whilst the CTS link does the same thing in reverse – it signals that the distant device is 'clear to send' the data over the serial link.

When implemented in software, flow control is much simpler, and is signified by the issuing of data flow on (X-on) and data flow off (X-off) commands over either the Tx or Rx links of a serial interface.

In simple terms all the X-on, X-off signals are doing is saying "Please wait a moment" to other devices. Because computers and their associated devices aren't human of course, they can dispense with the pleasantries and transmit/receive the X-on or X-off signals in a fraction of a second.

And that, in a nutshell, is the BBC Micro's RS423 port – a Tx and Rx link for the data itself (and X-on/X-off flow control signals), CTS and RTS links for hardware flow control and a centre signal ground pin to protect against outside interference and where appro-

Turn to Page 46 ▶

What is an RS232?

The RS232 interface is a standard for connecting business machines (including computers) with other devices using a serial data interface. The latest revision of the RS232 standard, known as the RS232-C, was formulated by the Electronic Industries Association (EIA) of Washington in the United States in 1969.

The RS423 serial interface seen on the BBC range of micros is a derivative of the RS232-C standard, and has 5, instead of 25 pins (as seen on the RS232-C connector).

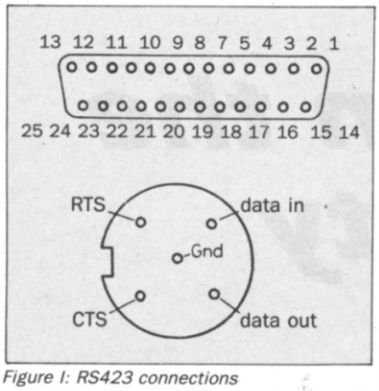

Figure I: RS423 connections

Pin	Description	Pin	Description
1	Protective Ground	14	Secondary Transmitted Data
2	Transmitted Ground	15	Transmission Signal Element Timing
3	Received Data	16	Secondary Received Data
4	Request to send	17	Received Signal Element Timing
5	Clear to Send	18	Unassigned
6	Data Set Ready	19	Secondary Request to Send
7	Signal ground	20	Data Terminal Ready
8	Received Line Signal Detector	21	Signal Quality Detector
9	Reserved for data testing	22	Ring Indicator
10	Ditto	23	Data Signal Rate Detector
11	Unassigned	24	Transmit Signal Element Timing
12	Secondary Received Line Signal	25	Unassigned
13	Secondary Clear to Send		

Figure II: RS232 pin assignments

◀ *From Page 45*

priate, to complete an electrical circuit for the Tx and Rx connections.

Referring to Figure I, We can see that the RS232 connector is much more complex than the BBC Micro's RS423 connector – hence the increased cost of such connectors.

You'll also note that the 25 pins of the 25-way RS232 connector are numbered in a right-to-left manner, from 1 to 13 on the top, and 14 to 25 on the bottom row.

Why 25 connections? In some very complex applications, notably scientific instrumentation, almost all of the 25 connections are used for different purposes, although fundamentally, each pin's function is the same, regardless of what device it is connected to. Because of this one pin-one purpose definition, the RS232 specification has 25 pins. A detailed analysis of all 25 pin's functions is shown in Figure II. Aren't you glad the BBC Micro only has 5 pins to worry about?

● *In the next part of this series of articles I shall be looking at the difference between seven and eight bit data and showing you how programs can be transferred between two BBC Micros and a BBC Micro and an Archimedes.*

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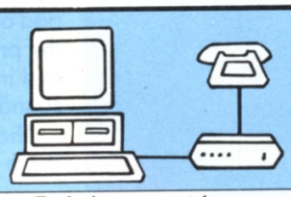

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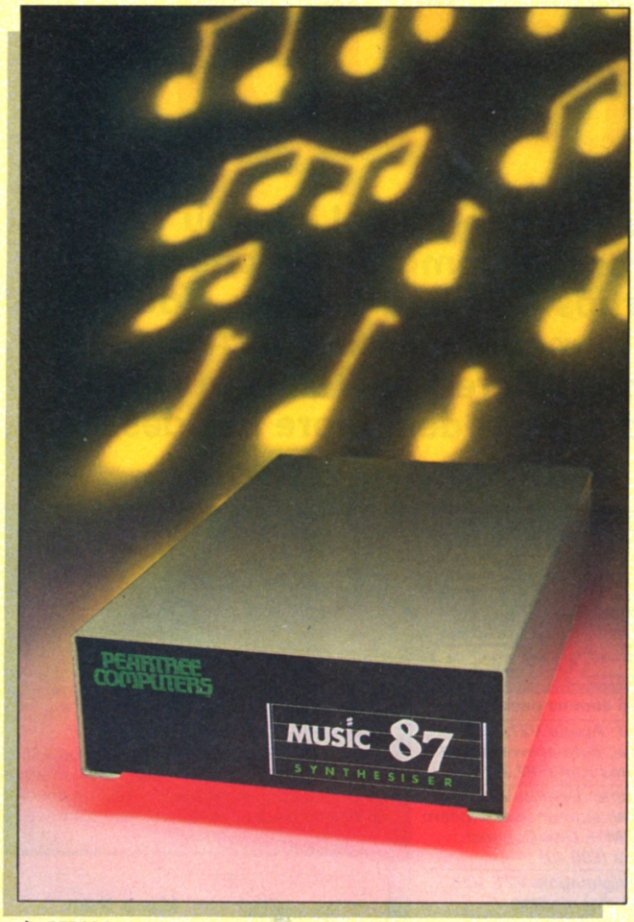

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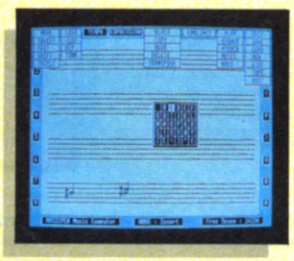

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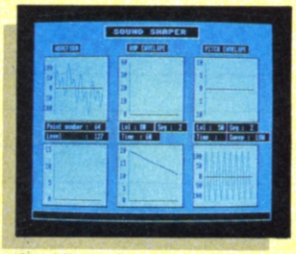

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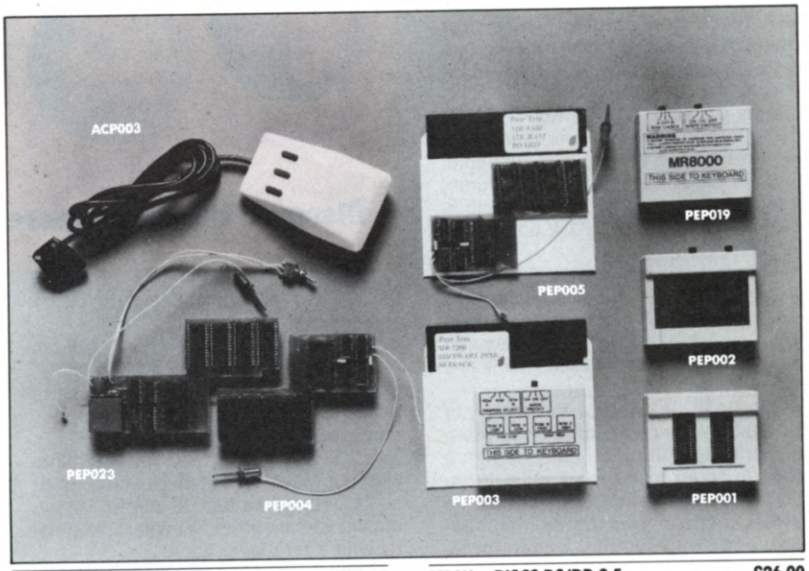

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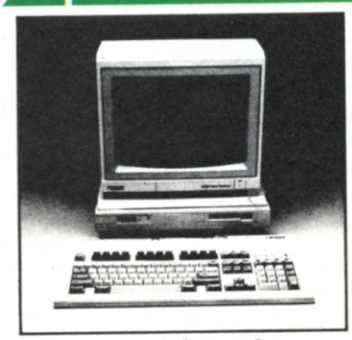

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consists of two models, ARCHIMEDES 305 with 0.5 Mbyte of RAM and ARCHIMEDES 310 with 1 Mbyte of RAM. These machines are the latest generation of British Broadcasting Corporation Micros. They offer, at low cost, all the basic features with expansion capabilities. Both machines have a 512 Kbyte ROM and a 1 Mbyte (unformatted) 3½" disc drive.

THE 400 SERIES

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PART 8

THIS month sees me, at last, with a Master of my own. But now I realise that there are some games that I will never be able to play again.

Roger Griffiths of St Davids, Dyfed, is a B+ owner in the same boat. His favourite game, Wizadore by Imagine, is, as mentioned in the July column, designed to work only on the combination of Model B with OS1.2 and not on the B+.

A letter to Imagine brought only a replacement tape. When I inquired, I was met with the polite but not very useful reply that no B+/Master compatible version of Wizadore exists nor is one planned.

The whole idea behind the design of the BBC Micro is of upward software compatibility with future models. It is a credit to Acorn that such a radical new machine as the Archimedes – unlike the newest models from other manufacturers – will run software written for its predecessors.

Software houses should in turn be prepared to give their support to owners of newer Acorn machines. An ideal solution would be to offer B+, Master or Archimedes owners a mail-order disc-for-tape upgrade to a compatible version of their software, for a nominal sum.

The goodwill generated would vastly outweigh any inconvenience caused to the software house, not to mention a new lease of life for many excellent games, like Wizadore, released before the arrival of the new computers. And as for all the free mentions that would follow in *The Micro User*'s letters page...

I see the latest in Acornwear is a trendy Archimedes tie-pin. Many thanks to Fiona Johnson of Acorn for sacrificing hers to a good cause – it's been pinned to my round green chest ever since.

I was most disappointed to find that Codename Droid, the latest escapade of Commander John Stryker, has not followed its predecessor in providing an extended version for the Master. That said, it's a great game.

Authors Martin Edmondson and Nicholas Chamberlain, of Ravenskull fame, have taken Chris Roberts's one-man-army and given him the task of destroying the Volgans on their home planet. It looks like a cross between its predecessor and Dr Who, but with much more depth than Stryker's Run.

Incidentally Chris Roberts is also the author of Wizadore and Ocean's Match Day, neither of which work on my new toy. Sadly, Match Day too has befallen the fate of Wizadore: Doesn't work, no upgrade.

I must, at this point, thank Superior and Tynesoft for providing me with Master-compatible versions of Citadel and Jet Set Willy II. Both are available to owners of an earlier version of the game, simply by returning the original cassette or disc, together with a stamped, addressed envelope.

Jet Set Willy I is also incompatible with the Master, but has been included in its entirety as part of the enhanced Master version of Jet Set Willy II, thereby making a far bigger game.

If any B+ or Master owners are interested in other programs that take advantage of the extra memory of their machine, Colossus Chess 4.0 by CDS is well worth considering. It features two versions, one for 32k machines and one for the B+ and Master. Either way, it's no pushover: it beat Acornsoft Chess in 16 out of 16 matches.

Kevin Blake is the author of a string of BBC Micro hits over the years, including the new Spy vs Spy. He's dropped me a line about a cheat mode built into his game, Future Shock, published by Tynesoft.

Once loaded, the game goes into a demonstration mode, showing a number of scenes from the game. When the page showing the credits to the authors is being displayed, type *TOERAG* very quickly. The ever-watching eyes turn light blue and you now have infinite lives.

Arkanoid from Imagine is a simple but incredibly addictive game based on the ancient Breakout theme. This actually does run on the Master (as long as you've got CONVERT running) and it's causing me far too many late nights. I hear that Peter Johnson, author of the BBC Micro and Atari ST versions, has a real Arkanoid arcade machine in his bedroom. No wonder the BBC Micro version was late...

Gary Partis, whose name seems to spring up in this column almost every month, is putting the finishing touches to *Impact!*, his Arkanoid basher, which should be out as you read this. It will be interesting to see which does the bashing.

Hot on the heels of the recently released Green Beret comes another near-legendary game: Audiogenic's Graham Gooch's Test Cricket for the B, B+ and Master.

I've never been a fan of computer cricket. This one is probably the most comprehensive implementation but it still failed to inspire me. You can define your own teams and their field positions and choose the length of play and use either keyboard or joystick control, to name but a few options. There's a full review of both Arkanoid and Test Cricket in Software Scene this month.

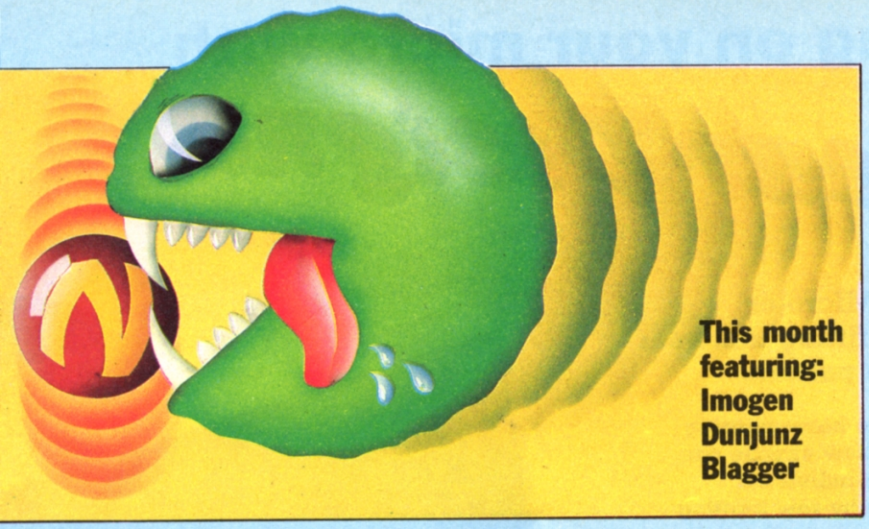
Steve James of East Barnet (who has produced complete XOR maps) would like it known that Cholo, the latest in a long line of Firebird mega-games, does not work with the Watford Electronics DDFS. Perhaps Firebird has a compatible version of the disc in the pipeline.

One of the most popular games at the moment is Imogen from Micro Power. A number of readers (too many to mention) have sent in the complete set of passwords for the game:

```
A: BALLOONACY
B: DRIPPING STUFF
C: SEE-SWORD
D: GNU-PROBLEM
E: WHIP-IT
F: SAXOPHOBIA
G: DOWN-AND-OUT
H: FOLLOW-ME
I: DUCK-EGG-BLUES
J: PAVLOV-WAS-HERE
K: TENDER-HOOKS
L: BABBOONACY
M: APPLESOURCE
N: HAMSTER-JAM
O: FIRE-WORKS
P: TIME-FLIES
```

A number of Opus Challenger owners will have found long ago that many protected games discs will not run on their systems. Imogen is normally no exception, but now – thanks to Jonathan Temple of Nottingham – it does. Simply type in Listing I and run it instead of pressing Shift+Break.

Jonathan has also sent in a cheat routine for Imogen that resets the remaining number of metamorphoses in a saved data file to 150, the starting



This month featuring:
Imogen
Dunjunz
Blagger

```
  10 REM Imogen-Opus converter
  20 REM by Jonathan Temple
  30 REM (C) The Micro User
  40 !&380=&5D08BC9
  50 !&384=&1D000E0
  60 ?&388=&60:?&389=&4C
  70 ?&38A=?&20A:?&38B=?&20B
  80 PRINT"Now insert IMOGEN disc"
  90 PRINT"and press a key..."
 100 IF GET THEN *DRIVE 0
 110 ?&20A=&80:?&20B=&3
 120 *RUN !BOOT
```

Listing I: Imogen disc – Opus Challenger conversion routine

value. Enter Listing II and RUN it. After a prompt, the program will load your previously saved data file, modify it and resave it under the same filename. To play, load Imogen proper, followed by your modified data file. You will be playing exactly where you left off, but with a full 150 metamorphoses remaining.

Simon Poole of Bradford has a tip for W.A.R. by Martech. Stay on the extreme left hand side of the screen and nothing can hit you, but don't forget the tall buildings – they'll destroy you if you bump into them.

One of the most popular arcade games is Gauntlet by Atari, a four-player hack and slay game. Earlier this year Bug-Byte released Dunjunz, a BBC Micro equivalent – still with four players – for only £2.99. It's a remarkable game at any price, but it does have its disadvantages.

First, from cassette it takes about 15 minutes to load and second, it can only be played from the keyboard. Ian Robertson, from Maybole, Ayrshire, has the solution to this disadvantage: a machine code patch routine that converts the game to use joysticks.

To start, enter Listing III, making sure you save a copy to tape before proceeding. Next, wind the Dunjunz tape to the beginning of the "Dunk" file and type RUN. The game will load and run as normal, but with the Barbarian and Warrior operating under joystick control. You can, of course, still use the Ranger and Wizard from the keyboard.

Ian rounds us off this month with a couple of pokes for Alligata's veteran platform game, Blagger. To change the start level and number of lives, enter the following:

```
*LOAD Blag1
*LOAD Blag2
*LOAD Blag3
*LOAD Blag4
```

Then:

```
?&293E=  (desired level)
?&293A=  (number of lives)
CALL &3049
```

The remaining sections will load and the game will commence as normal.

● *That's all for this month, but more goodies are on the way.*

Hac-Man

```
  10 REM Imogen extra metamorphoses
  20 REM by Jonathan Temple
  30 REM (C) The Micro User
  40 osfile=&FFF7
  50 F$="IMODAT":REM change to actual fi
lename
  60 PRINT"Insert ";F$;" data file, hit
a key...";:G%=GET
  70 $&900="LOAD "+F$
  80 X%=0:Y%=9:CALL osfile
  90 ?&9EC=48:?&9ED=53:?&9EE=49
 100 $&900="SAVE "+F$+" 9EA A6F"
 110 X%=0:Y%=9:CALL osfile
```

Listing II: Imogen extra metamorphoses poke

```
  10 REM Dunjunz Joystick converter
  20 REM by Ian Robertson
  30 REM (C) The Micro User
  40 DIM KO%(20),KN%(20),VO%(20),J$(4)
  50 FOR Q%=1 TO 10:READ V$:VO%(Q%)=ASC
(V$):NEXT
  60 FOR T%=1 TO 4:READ J$(T%):NEXT
  70 PRINT"Dunjunz is loading...."
  80 A%=10
  90 FOR Q%=1 TO A%
 100 KO%(Q%)=FNlookup(VO%(Q%))
 110 NEXT
 120 PROCassem
 130 oldkeys=oldkeys+&A00:newkeys=newke
ys+&A00
 140 FOR Q%=1 TO A%:oldkeys?(Q%-1)=256+
KO%(Q%):NEXT
 150 FOR T%=0 TO 2 STEP 2
 160 P%=&900:[OPTT%:LDY# 0:.loop234 LDA
 &A00,Y:STA &0,Y:INY:CPY# 0% MOD 256:BNE
 loop234:LDA# 0:STA &20A:STA &20B:LDX# d
ef MOD 256:LDY# def DIV 256:JSR &FFF7:.d
ef EQUS "/DUNK":EQUB 13:]:NEXT
 170 *TAPE
 180 CALL &900
 190 DEFFNlookup(P)
 200 IF P=13 =-74
 210 IF P<0 FOR T%=0 TO 800:NEXT:=P
 220 LOCAL Z
 230 IF P>126 RESTORE 360:FOR T%=127 TO
 P:READ Z:NEXT:=-Z
 240 RESTORE 310:FOR T%=32 TO P:READ Z:
NEXT:=-Z
 250 DATA " ",0,.,/,K,","
 260 DATA U,I,G,B
 270 DATA left,right,up,down
 280 REM
 290 REM lookup table for negative inke
y values
 300 REM
 310 DATA 99,0,0,0,0,0,0,0,0,0,0,0
 320 REM 11 zeroes
 330 DATA 103,24,104,105,40,49,50,18,19
,20,53,37,22,39,73,88
 340 DATA 0,0,0,0,72,66,101,83,51,35,68
,84,85,38,70,71,87,102,86,55,56,17
 350 DATA 52,82,36,54,100,34,67,69,98,5
7,121,89,25,41
 360 DATA 90,33,114,115,116,21,117,118,
23,119,120,0,106,26,122,42,58
 370 DEFPROCassem
 380 FORT%=0TO2 STEP 2:P%=&00:O%=&A00
 390 Z%=!&20A AND&FFFF:[OPTT%+4
 400 CMP# 129:BEQ go:.ret JMP Z%:.go CP
Y# 255:BNE ret
 410 PHA:STX store:TYA:PHA:LDX#0:.loop1
 420 LDA oldkeys,X:CMP store:BEQ found:
INX:CPX# 10:BNE loop1:.exit PLA:TAY:PLA:
LDX store:JMP Z%
 430 .found PLA:PLA:TXA:TAY:LDX newkeys
,Y:STY store:LDA# 128:JSR Z%
 440 LDA store:AND#&FE:BNE nonfir:TXA:A
ND# 3:TAY:.nonfir
 450 LDX store:TYA:CMP values,X
 460 BNE exitroot:LDY# &FF:LDX# &FF:RTS
:.exitroot LDX#0:LDY#0:RTS
 470 .store EQUB 0
 480 .oldkeys EQUD 0:EQUD 0:EQUW 0
 490 .newkeys EQUW 0:EQUB 1:EQUB 1:EQUB
 2:EQUB 2:EQUB 3:EQUB 3:EQUB 4:EQUB 4
 500 .values EQUB 1:EQUB 2:EQUW &FF:EQU
W &FF:EQUW &FF:EQUW &FF
 510 ]:NEXT
 520 ENDPROC
```

Listing III: Dunjunz tape – joystick conversion routine

Get knitting on your micro with

Knitwear Designer

Now you can use your BBC Micro or Electron to design perfectly-fitting knitwear – then print out the complete pattern.

It's the biggest development since the home knitting machine – and it's so simple to use. Now anyone can use a computer to design knitwear to individual measurements and then produce row-by-row knitting instructions on the printer.

YOU CAN:

- **Work with any yarn, from fine cottons to chunky wools**
- **Enter your natural tension and the pattern adjusts to the way you knit**
- **Select from three preset patterns – Raglan sleeve, drop and square shoulder**
- **Use the Freehand program to produce custom designs**

Say goodbye to badly-fitting home knitting. With one of the five programs included in the package, and using the clearly written manual, you can produce perfect results every time.

The program itself produces a plain knit, leaving you to use your own favourite stitch pattern, such as the Fair Isle design featured here.

To order please turn to the form on Page 141

£8.95
Cassette
Also available on disc for use on the Advanced Plus 4 and Slogger SEDFS.
£9.95
5¼" disc

DATABASE PUBLICATIONS

Read all the news on Ceefax with Jeremy Brayshaw's great news program

UTILITY

B | B+ | M | Compact

HOW up-to-date is your morning newspaper? No matter how efficient the presses are, you can't get a paper with more recent news than the Ceefax Daily News.

The program *News* given here will produce a printed copy of all the latest news stories from Ceefax pages. Simply run the program when you get out of bed and your newspaper will be delivered before breakfast. And it will cost just the price of the paper it's printed on.

Within minutes of a news story breaking, the Ceefax news team can have the details on air and available to millions of people nationwide. Now you can have your own printed copy of the very latest news – many hours before the most efficient newspaper can release the stories.

The program looks at the news pages from Ceefax (pages 103 to 118), gets rid of colour control codes and the like then merges alternate lines to produce rows of text suitable for a standard 80-column printer.

It has been deliberately designed for use with any printer and therefore produces only the normal Ascii characters and no printer control codes at all. This compatibility has been achieved at the loss of correct interpretation of the quarter, half and three-quarter symbols, which will appear as curly brackets and oblique stroke. However, these are not common symbols on the news pages and should rarely affect the output.

One symbol that does differ from printer to printer is the pound sign. If your printer uses a code other than 35 to print this character then remove the REM from line 960, suitably adjusting the rest of the line to give the code your printer requires.

The program does, of course, need a teletext adapter.

To achieve a tolerable speed, 17 of the adapter's page grabbers are put into action to simultaneously grab all the news pages, plus the news index page (page 102). The latter is used to provide a suitable heading to each story, which is included in the printout underlined with = characters to ensure compatibility with most printers. By using several page grabbers, the entire Ceefax news section can be received in less than 20 seconds, whereas receiving just one page at a time would take around 6 minutes.

The stories themselves are stripped of teletext control codes. Trailing and leading spaces on each row are removed then each pair of lines joined together to produce up to 79 characters per row of text (suitable for standard printer paper or a Mode 131 display).

Because the whole news area of Ceefax is committed to computer memory, there is not enough space left for high resolution (80 column) screen modes. For those who have shadow screen memory on their machines, a good display can be obtained by selecting MODE 131 in line 170 instead of MODE 7. For those without such facilities, using MODE 3 will crash the system. However, as the program is primarily for printed copy, the screen mode is not important.

You may also produce a text file of the news, ready to be *TYPEd or READ into a word processor. Here you can really begin to play editor, adjusting the news stories as you want. Simply choose this option when prompted and you will be asked for a filename.

In order to make the procedure as versatile as possible with different filing systems, no check is made as to the suitability of the given name for the filing system in use. Such checks must be made manually in order to avoid overwriting some important file or getting the bad filename error.

Because of the hardware restrictions of certain designs of teletext adapter, the program cannot be guaranteed compatible with all adapter makes. It has been written for use with the BBC Microcomputer System adapter.

So take a copy of your very own Ceefax Daily News to work and keep really up to date with the news. If you want the late or the evening editions, just run the program and your copy will be delivered within minutes.

Turn to Page 56 ►

◀ From Page 55

```
  100 REM **********************
  110 REM *  A newspaper from  *
  120 REM *    CEEFAX pages    *
  130 REM * by Jeremy Brayshaw *
  140 REM * (c) The Micro User *
  150 REM **********************
  160 *TV0,1
  170 MODE7
  180 IFFNadapter<>0 PRINT"CHR$134;"Sor
ry, not receiving teletext."":END
  190 VDU23;8202;0;0;0;
  200 *TELESOFT
  210 DIMC% 30
  220 DIML$(40)
  230 DIM U% &4400
  240 *HON
  250 *BBC1
  260 PROCsetpages
  270 FORN%=0TO16
  280 PROCsetgrabber(N%,1,EVAL("&"+STR$(
N%+2)),&3F7F,U%+(N%*&400))
  290 NEXT
  300 PROCselect
  310 PROCwait_for_pages
  320 PROCstop_updates
  330 *HOFF
  340 MODE7
  350 REM MODE131
  360 IFprint%:VDU2
  370 IFfile%:PROCoscli("SPOOL "+fname$)
  380 PROCprintpages
  390 *TTXOFF
  400 *SPOOL
  410 VDU3
  420 PROCreset_grabbers
  430 END
  440 DEFPROCsetpages
  450 C%?0=7:C%?1=24
  460 A%=&7A:X%=C%MOD256:Y%=C%DIV256:CAL
L&FFF1
  470 ENDPROC
  480 DEFPROCsetgrabber(n%,m%,p%,sp%,st%
)
  490 A%=&7A:C%?0=5:X%=C%MOD256:Y%=C%DIV
256
  500 C%?1=n%:C%?2=m%:C%?3=p%:C%?4=sp%DI
V256:C%?5=sp%MOD256:C%?6=st%MOD256:C%?7=
st%DIV256
  510 CALL&FFF1
  520 ENDPROC
  530 DEFFNcheck_got(no%)
  540 A%=&7A:C%?0=2:X%=C%MOD256:Y%=C%DIV
256
  550 C%?1=no%:CALL&FFF1
  560 IF(C%?2)AND2=2 =TRUE ELSE =FALSE
  570 DEFPROCoscli(s$)
  580 X%=C%MOD256:Y%=C%DIV256:$C%=s$
  590 CALL&FFF7
  600 ENDPROC
  610 DEFPROCstop_updates
  620 A%=&7A:C%?0=2:X%=C%MOD256:Y%=C%DIV
256
  630 FORJ%=0TO16
  640 REPEAT
  650 C%?1=J%:CALL&FFF1
  660 UNTIL((C%?2)AND4)=0
  670 PROCset_hold(J%)
  680 NEXT
  690 ENDPROC
  700 DEFPROCset_hold(no%)
  710 A%=&7A:C%?0=3:X%=C%MOD256:Y%=C%DIV
256
  720 C%?1=no%:C%?2=3:CALL&FFF1
  730 ENDPROC
  740 DEFPROCreset_grabbers
  750 A%=&7A:X%=C%MOD256:Y%=C%DIV256
  760 C%?0=14
  770 CALL&FFF1
  780 ENDPROC
  790 DEFPROCwait_for_pages
  800 REPEAT:S%=TRUE
  810 FORG%=0TO16:IF NOT FNcheck_got(G%)
S%=FALSE
  820 NEXT
  830 UNTILS%=TRUE
  840 ENDPROC
  850 DEFPROCprintpages
  860 LOCAL C%,G%
  870 PRINT"CEEFAX News ";:*TDATE
  880 PRINT"======================"
  890 PRINT"Time: ";:*TTIME
  900 PRINT"=============="
  910 FORG%=U%+&400 TO (U%+&4000) STEP &
400
  920 FORCL%=0TO40:L$(CL%)="":NEXT
  930 FORC%=G%+160 TO G%+960:?C%=(?C%)AN
D&7F
  940 IF?C%=19 AND ?(C%+1)=175 ?(C%+1)=A
SC"*"
  950 IF?C%<32 ?C%=32
  960 REM IF?C%=35 ?C%=<Printer code for
 £ sign>
  970 NEXT
  980 PRINT"FNprinttitle(((G%-U%)DIV&40
0)+2)
  990 LC%=0
 1000 FORC%=G%+160 TO G%+880 STEP40
 1010 LC%=LC%+1
 1020 TE%=?(C%+40):?(C%+40)=&D:L$=$C%:?(
C%+40)=TE%
 1030 IF L$=STRING$(40," ") L$(LC%)="":L
C%=LC%+1:PROCcheckline
 1040 TE%=40
 1050 IFMID$(L$,TE%,1)=" ":REPEAT:TE%=TE
%-1:UNTILMID$(L$,TE%,1)<>" " OR TE%=0
 1060 LE%=0:REPEAT:LE%=LE%+1:UNTILMID$(L
$,(LE%+1),1)<>" ":L$=RIGHT$(L$,LEN(L$)-L
E%)
 1070 L$(LC%)=LEFT$(L$,TE%-LE%)
 1080 NEXT
 1090 FORLC%=1TO38 STEP 2
 1100 IFLC%>2:IFL$(LC%-2)+L$(LC%-1)+L$(L
C%)+L$(LC%+1)="" GOTO1120
 1110 PRINTL$(LC%);" ";L$(LC%+1)
 1120 NEXT
 1130 NEXT
 1140 ENDPROC
 1150 DEFPROCcheckline
 1160 IF LC%MOD2=1 L$(LC%)="":LC%=LC%+1
 1170 ENDPROC
 1180 DEFFNprinttitle(pn%)
 1190 st%=U%+((pn%+4)*40)+10
 1200 FORz%=st% TO st%+40:?z%=(?z%)AND&7
F:IF?z%<32 ?z%=32
 1210 NEXT
 1220 t%=st%?40:st%?40=&D:L$=$st%:st%?40
=t%
 1230 TE%=30
 1240 IFL$=STRING$(TE%," ") =""
 1250 IFMID$(L$,TE%,1)=" ":REPEAT:TE%=TE
%-1:UNTILMID$(L$,TE%,1)<>" " OR TE%=0
 1260 IF LEFT$(L$,1)=" " L$=RIGHT$(L$,LE
N(L$)-1):TE%=TE%-1:IFTE%<0 TE%=0
 1270 =LEFT$(L$,TE%)+CHR$10+CHR$13+STRIN
G$(TE%,"=")
 1280 DEFFNadapter
 1290 A%=&7A
 1300 X%=C%  MOD256:Y%=C% DIV256
 1310 C%?0=17:CALL&FFF1:=C%?1
 1320 DEFPROCselect
 1330 PRINTTAB(5,1);:VDU141,132,157,131:
PRINT"CEEFAX News Print ";:VDU156
 1340 PRINTTAB(5,2);:VDU141,132,157,131:
PRINT"CEEFAX News Print ";:VDU156
 1350 PRINT"CHR$134;"Send details to fi
le? (Y/N)";CHR$131;
 1360 REPEAT:Q=GET AND&DF:UNTILQ=78 OR Q
=89:IFQ=89 PRINT"Yes":file%=TRUE ELSEPRI
NT"No":file%=FALSE
 1370 IFfile%:PRINT'CHR$134;"File name:"
;CHR$131;:INPUT"fname$
 1380 PRINT"CHR$134;"Print newspaper? (
Y/N)";CHR$131;
 1390 REPEAT:Q=GET AND&DF:UNTILQ=78 OR Q
=89:IFQ=89 PRINT"Yes":print%=TRUE ELSEPR
INT"No":print%=FALSE
 1400 PRINT"CHR$131;"Waiting for news p
ages ...";
 1410 ENDPROC
```

This listing is included in this month's tape & disc offer. See order form on Page 141.

Get it right!

```
100 =     0 0
110 =     0 0
120 =     0 0
130 =     0 0
140 =     0 0
150 =     0 0
160 = DDC0 0
170 = 8AFC B
180 = DD10 B
190 = F716 E
200 = 198A 0
210 = B0F5 1
220 = 8891 8
230 = 34B9 1
240 = 5F11 A
250 = C0CE 9
260 = B5C7 3
270 = 1733 E
280 = 39FA 1
290 = 2C83 3
300 = F89D A
310 = 1221 C
320 = 284E 3
330 = 1BB1 A
340 = 8AFC 6
350 =     0 6
360 = 6BB7 0
370 = DA28 0
380 = A098 1
390 = 39B5 4
400 = 98F7 8
410 =   6BC 6
420 = 5C0D 5
430 = FD2E B
440 = 3F44 A
450 = 1BBE 0
460 = 74B4 7
470 = ED0F 7
480 = 944A E
490 = 1518 B
500 = 5916 6
510 = 8B74 C
520 = ED0F 1
530 = BE2C 8
540 = 1C98 0
550 = A618 C
560 = 4AAB 1
570 = 8C8A 3
580 = 6223 D
590 = EBB2 5
600 = ED0F C
610 = FFD7 C
620 = 1C98 C
630 = D6F5 B
640 = BFBA 9
650 = 2127 6
660 = B3BE 5
670 = 142A D
680 = 2C83 5
690 = ED0F 2
700 = 8DDA 2
710 = C96E D
720 = 2739 2
730 = ED0F 7
740 = C22D C
750 = 53DB A
760 = F11E 4
770 = 8B74 F
780 = ED0F 2
790 = 8C01 F
800 = 5E17 9
810 = 2D34 B
820 = 2C83 0
830 = D8C6 A
840 = ED0F 3
850 = F520 E
860 = B92F 2
870 = B064 6
880 = 5187 9
890 =   BD3 4
900 = 2663 6
910 = 2991 0
920 = 824E 1
930 = 4752 7
940 = E38F 6
950 = FB1F 3
960 =     0 3
970 = 2C83 C
980 = 7284 1
990 = 47AF F
1000 = 77E5 6
1010 = 5CA9 7
1020 =  26B 0
1030 = 7B40 7
1040 = B7F7 1
1050 = 2107 9
1060 = 1DBF 8
1070 = 1524 3
1080 = 2C83 3
1090 = 91D9 7
1100 = 497D 8
1110 = 74B6 8
1120 = 2C83 C
1130 = 2C83 E
1140 = ED0F B
1150 = B9A4 1
1160 = CC32 9
1170 = ED0F 4
1180 =   DAA 4
1190 = 5E5C 8
1200 = 2D73 4
1210 = 2C83 4
1220 = EB43 F
1230 = 2E60 8
1240 = 921B 5
1250 = 2107 1
1260 = A89C 7
1270 = 43A4 9
1280 = 69DA E
1290 = E1BD 0
1300 = 4C5F 8
1310 = 2D5D 2
1320 = 981C 2
1330 = 4E6D E
1340 = 616F 7
1350 = 62AC 7
1360 = 2984 5
1370 = 14D3 7
1380 = F731 8
1390 = 247F A
1400 = 3F8A 3
1410 = ED0F 0
```

MicroLink
in association with
TELECOM GOLD

NEWSLETTER

Spreading the word

IN the centenary year of the international language Esperanto, a new branch – or Grupo to be exact – has been formed in London, and MicroLink is its chosen electronic route to the rest of the world.

About 52 million people worldwide – 8 million in Europe – speak the amalgam of Anglo-Saxon and Latinate tongues invented in 1887 by Polish doctor Ludovic Zamenhov.

The Sud-Londona Esperanto-Grupo has been going for five months.

Secretary Gregory Porilo said: "We believe the time is ripe for a revival of interest in Esperanto. Not just because of its centenary, but also because it has been accepted as a subject for the new GCSE exams and is now the EEC's official language for basic translation.

"The South London branch of Esperanto is using MicroLink to further spread the word about the benefits of learning the language".

Typesetting over the line

LOW-COST, professional quality typesetting for everything from business cards to magazines is now available electronically on MicroLink.

Wordstream provides a 24-hours-a-day, seven-days-a-week service for companies and individuals who want to control their own printing and save on costs.

All subscribers need do is key in the text on their micro and send it via MicroLink's electronic mail system. It is switched electronically to Wordstream in Bournemouth who typeset the material and return the finished product by first class post or special delivery.

Text for typesetting can be prepared on an ordinary word processor by inserting special codes to specify typefaces, sizes and measures. Then it is transmitted to the Wordstream mailbox on MicroLink.

Special software automatically checks the text file to ensure that codes are correct, and initiates processing immediately. Within 30 minutes a bromide repro for plate-making or camera is produced for despatch to the customer.

The service offers 155 typefaces from 4.5 to 72 point. The range includes expanded, condensed and italic type, variable letterfit, accents and fractions, and paper-saving multi column text.

Payment is by the foot length of repro and Wordstream registration is free on MicroLink.

SPEEDING THE FACTS

NEARLY 30 of Scotland's largest local authorities and six local government trades unions are communicating electronically via MicroLink.

The Scottish Local Government Information Unit was set up two years ago as an information research and publicity service for the organisations.

"We feed facts and figures in easily digestible format to well over 1,000 key elected officials and administrators", said the Unit's director Archie Fairley.

"In addition we are a source of local government information.

"MicroLink telex and electronic mail facilities will help us move all this information a lot faster than before".

Aid to trade

MICROLINK technology is helping improve trade links between Britain and the Third World.

Latest overseas businessman to take advantage of fast, efficient telex and electronic mail facilities is S.S.Wijayasinha.

He is managing director of Bureau-Matic, based in Abidjan, capital of the Ivory Coast, a former French colony in West Africa.

"My company imports computer accessories from various suppliers in the UK, but existing communications are not satisfactory", he said.

"Letters can take up to three weeks to arrive and the telephone service is very erratic.

"I plan to use MicroLink for all my international communications from now on because I know I can depend on its speed and reliability".

New Open University Club

LIKE many of the Open University's 70,000 plus students, electronics engineer Jim Hatton often feels a sense of isolation.

"I can't get to evening classes every week, I have little or no contact with other OU students, and though the instructors are very helpful they are also very busy and I dislike bombarding them with letters and phone calls", he said. Jim's solution – for himself and other part-time students in the same situation – has been to form an Open University Club on MicroLink where people can communicate electronically about their courses.

"At a recent summer school I discovered that a lot of people like me can't get to the tutorials", he said. "But lots of us have micros and modems, so the technology for exchanging ideas and opinions is there to be tapped.

"The Open University has a policy of encouraging self help groups where students can discuss problems and gain a greater understanding of their courses.

"I'm hoping that OU instructors will also log on to the Open University Club on MicroLink so that students can benefit from their input too".

ACORNSOFT

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FOR THE ELECTRON

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(Spreadsheet)	£14.95
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ELECTRON COMPUTERS IN STOCK NOW
3 months warranty
£59.95
*Includes user guides, power supply and introductory cassette

SAVE £££'s ELECTRON PACKS

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PACKAGE 2

ELECTRON COMPUTER	£59.95
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VIEW ROM	£14.95
	~~£124.85~~
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CUMANA DISC DRIVE INTERFACE FOR ELECTRON £69.95
ENABLES YOU TO USE MOST BBC DISCS AND CARTRIDGES UP TO 32K

VOLTMACE TWIN JOYSTICKS
for use with Plus 1 or BBC
Normally ~~£19.95~~
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I DO	~~£12.65~~	English	~~£12.65~~

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*Sentence sequence
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*Talkback
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£1.50 each (CASSETTE)

SPECIAL OFFER — ACORNSOFT
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EDUCATION COMPENDIUM
Workshop (3+ years)
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Me and My Micro (Book Only)	£2.95	£1.00

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Bug Eyes III	~~£9.95~~	£7.95
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Repton III	~~£9.95~~	£7.95
Grand Prix Construction	~~£14.95~~	£11.95
Strykers Run	~~£14.95~~	£11.95
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Acornsoft Hits Vol II	~~£14.95~~	£11.95
Superior Collect Vol I	~~£14.95~~	£11.95

*BBC COMPATIBLE

SAE for comphensive price lists
Please state for which machine

HOME INTEREST

Snapper	~~£6.99~~	*Desk Diary	~~£6.99~~
Boxer	~~£6.99~~	*Business Games	~~£6.99~~
*Watch your Weight	~~£6.99~~	*Graphs and	
Theatre Quiz	~~£6.99~~	Charts	~~£6.99~~
Complete Cocktail Maker			~~£6.95~~

SELECT ANY FIVE FOR ONLY £7.95
(or £1.65 each)

RECENT RELEASES AT SPECIAL PRICES

Superior Collection 1, 2 or 3		Cholo	
BBC/Electron	~~£9.95~~ £7.95	BBC Disk	~~£17.95~~ £14.35
Oxbridge		Grand Prix Cons.	
BBC/Electron	~~£7.95~~ £6.35	BBC	~~£9.95~~ £7.95
Beau Jolly 5 Comp hits		Firetrack	
BBC/Electron	~~£6.95~~ £5.55	BBC	~~£9.99~~ £7.95
Five Star II		Repton III	
BBC/Electron	~~£9.95~~ £7.95	BBC/Electron	~~£9.95~~ £7.95

NEW ACORNSOFT OVERVIEW
A sophisticated combination of Viewspell & Viewstore on Rom Cartridge and Viewplot, View index and Printer Driver Generator on Disc
BBC Disc & Rom R.R.P. ~~£98.90~~
OFFER PRICE £78.45

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Combines the functions of a wordprocessor spreadsheet and database in one program.
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Killer Gorilla	~~£7.95~~	Moonraider	~~£7.95~~	Star Drifter	~~£3.95~~

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IN THE CHARTS NOW 10 ORIGINAL HITS
FANTASTIC VALUE

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An interesting point

David Wilson takes a look at loan repayments

HAVE you ever wondered how much you still owe on your loan? You know how much you borrowed, the interest rate and how much you are paying, but the amount outstanding is often a mystery.

This program gives a rough guide to the answer. It can only be approximate because of the different ways interest is added – monthly, quarterly, half-yearly or annually.

It is based on the interest being calculated added on quarterly with the first addition one month after the loan was taken out. This gives quite accurate results when the results of the program are compared with bank loan figures.

When you run the program you have to give the program four values: the amount borrowed, the interest rate, the rate of repayment and the month of the first payment.

The amount borrowed should be in pounds, the interest as a percentage, the repayment in pounds and pence and the first month as a number (1 to 12). Sample figures for you to try are £1000, 12.5%, £33.39 and 4 (April) and the loan will be paid in 3 years.

Once you've entered the figures you will be presented with data for the first year. You are reminded how much you borrowed, the rate and the amount you are paying each month together with the following information:

Interest shows the amount added to what you owe. It's added each quarter and you'll notice that, providing you've entered realistic figures, it is less each time. This is because the interest is calculated on what you owe – and you're paying some off all the time.

Tot Paid lets you know how much you've paid all together. *Tot Int* gives the figure for the total interest you've paid to date. The difference between this and *Tot Paid* shows how much of your money

Turn to Page 60 ▶

```
Year:1
Borrowed:£5000 @ 17%  Payment:£90

              May       Jun       Jul       Aug
Interest      0.00    208.67      0.00      0.00
Tot Paid     90.00    180.00    270.00    360.00
Tot Int       0.00    208.67    208.67    208.67
Balance    4910.00   5028.67   4938.67   4848.67

              Sept       Oct       Nov       Dec
Interest    206.07      0.00      0.00    203.35
Tot Paid    450.00    540.00    630.00    720.00
Tot Int     414.74    414.74    414.74    618.10
Balance    4964.74   4874.74   4784.74   4898.10

              Jan       Feb       Mar       Apr
Interest      0.00      0.00    200.52      0.00
Tot Paid    810.00    900.00    990.00   1080.00
Tot Int     618.10    618.10    818.61    818.61
Balance    4808.10   4718.10   4828.61   4738.61

Press any key to continue
```

```
Year:2
Borrowed:£5000 @ 17%  Payment:£90

              May       Jun       Jul       Aug
Interest      0.00    197.57      0.00      0.00
Tot Paid   1170.00   1260.00   1350.00   1440.00
Tot Int     818.61    1016.18   1016.18   1016.18
Balance    4648.61   4756.18   4666.18   4576.18

              Sept       Oct       Nov       Dec
Interest    194.49      0.00      0.00    191.28
Tot Paid   1530.00   1620.00   1710.00   1800.00
Tot Int     1210.67   1210.67   1210.67   1401.95
Balance    4688.67   4598.67   4500.67   4601.95

              Jan       Feb       Mar       Apr
Interest      0.00      0.00    187.93      0.00
Tot Paid   1890.00   1980.00   2070.00   2160.00
Tot Int     1401.95   1401.95   1589.88   1589.88
Balance    4511.95   4421.95   4519.88   4429.88

Press any key to continue
```

```
Year:3
Borrowed:£5000 @ 17%  Payment:£90

              May       Jun       Jul       Aug
Interest      0.00    184.44      0.00      0.00
Tot Paid   2250.00   2340.00   2430.00   2520.00
Tot Int     1589.88   1774.32   1774.32   1774.32
Balance    4339.88   4434.32   4344.32   4254.32

              Sept       Oct       Nov       Dec
Interest    180.81      0.00      0.00    177.02
Tot Paid   2610.00   2700.00   2790.00   2880.00
Tot Int     1955.13   1955.13   1955.13   2132.15
Balance    4345.13   4255.13   4165.13   4252.15

              Jan       Feb       Mar       Apr
Interest      0.00      0.00    173.07      0.00
Tot Paid   2970.00   3060.00   3150.00   3240.00
Tot Int     2132.15   2132.15   2305.22   2305.22
Balance    4162.15   4072.15   4155.22   4065.22

Press any key to continue
```

```
Year:4
Borrowed:£5000 @ 17%  Payment:£90

              May       Jun       Jul       Aug
Interest      0.00    168.95      0.00      0.00
Tot Paid   3330.00   3420.00   3510.00   3600.00
Tot Int     2305.22   2474.16   2474.16   2474.16
Balance    3975.22   4054.16   3964.16   3874.16

              Sept       Oct       Nov       Dec
Interest    164.65      0.00      0.00    160.17
Tot Paid   3690.00   3780.00   3870.00   3960.00
Tot Int     2638.82   2638.82   2638.82   2798.99
Balance    3948.82   3858.82   3768.82   3838.99

              Jan       Feb       Mar       Apr
Interest      0.00      0.00    155.51      0.00
Tot Paid   4050.00   4140.00   4230.00   4320.00
Tot Int     2798.99   2798.99   2954.50   2954.50
Balance    3748.99   3658.99   3724.50   3634.50

Press any key to continue
```

```
Year:5
Borrowed:£5000 @ 17%  Payment:£90

              May       Jun       Jul       Aug
Interest      0.00    150.64      0.00      0.00
Tot Paid   4410.00   4500.00   4590.00   4680.00
Tot Int     2954.50   3105.14   3105.14   3105.14
Balance    3544.50   3605.14   3515.14   3425.14

              Sept       Oct       Nov       Dec
Interest    145.57      0.00      0.00    140.28
Tot Paid   4770.00   4860.00   4950.00   5040.00
Tot Int     3250.71   3250.71   3250.71   3390.99
Balance    3480.71   3390.71   3300.71   3350.99

              Jan       Feb       Mar       Apr
Interest      0.00      0.00    134.77      0.00
Tot Paid   5130.00   5220.00   5310.00   5400.00
Tot Int     3390.99   3390.99   3525.75   3525.75
Balance    3260.99   3170.99   3215.75   3125.75

Press any key to continue
```

```
Year:6
Borrowed:£5000 @ 17%  Payment:£90

              May       Jun       Jul       Aug
Interest      0.00    129.02      0.00      0.00
Tot Paid   5490.00   5580.00   5670.00   5760.00
Tot Int     3525.75   3654.77   3654.77   3654.77
Balance    3835.75   3874.77   2984.77   2894.77

              Sept       Oct       Nov       Dec
Interest    123.03      0.00      0.00    116.78
Tot Paid   5850.00   5940.00   6030.00   6120.00
Tot Int     3777.80   3777.80   3777.80   3894.58
Balance    2927.80   2837.80   2747.80   2774.58

              Jan       Feb       Mar       Apr
Interest      0.00      0.00    110.27      0.00
Tot Paid   6210.00   6300.00   6390.00   6480.00
Tot Int     3894.58   3894.58   4004.85   4004.85
Balance    2684.58   2594.58   2614.85   2524.85

Press any key to continue
```

```
Year:7
Borrowed:£5000 @ 17%  Payment:£90

              May       Jun       Jul       Aug
Interest      0.00    103.48      0.00      0.00
Tot Paid   6570.00   6660.00   6750.00   6840.00
Tot Int     4004.85   4108.33   4108.33   4108.33
Balance    2434.85   2448.33   2358.33   2268.33

              Sept       Oct       Nov       Dec
Interest     96.40      0.00      0.00     89.03
Tot Paid   6930.00   7020.00   7110.00   7200.00
Tot Int     4204.74   4204.74   4204.74   4293.77
Balance    2274.74   2184.74   2094.74   2093.77

              Jan       Feb       Mar       Apr
Interest      0.00      0.00     81.34      0.00
Tot Paid   7290.00   7380.00   7470.00   7560.00
Tot Int     4293.77   4293.77   4375.10   4375.10
Balance    2003.77   1913.77   1905.10

Press any key to continue
```

◀ From Page 59

has gone towards actually paying off the loan. *Balance* indicates the sum you still owe.

Once you've studied the figures for the first year, pressing any key will take you to the second and you can continue until the balance falls below zero which means the loan has been paid off.

The real value of this program lies in checking the "What if" possibilities of different repayments and interest rates for even the slightest changes can alter the time required for pay-off dramatically.

Get it right!

```
  10 MODE7:@%=&20208
  20 PRINT:PRINTTAB(10)"Loan Calculator
  30  PRINT:INPUT"How much are you borr
owing? £"principal:bal=principal
  40 PRINT:INPUT"What is the annual int
erest rate? "rate
  50 PRINT:INPUT"How much are you payin
g a month? £"repay
  60 PRINT:PRINT"Which month did the lo
an start? ":INPUT"Answer 1 (Jan) to 12 (
Dec)."start
  70 IFstart<10Rstart>12 THEN 60 ELSE s
tart = 12-start
  80 PROCsetup
  90 REPEAT
 100 CLS:PRINT"Year:"STR$(year):PRINT"B
orrowed:£"STR$(principal)" @ "STR$(rate)
"%  Payment:£"STR$(repay):year=year+1
 110 FORcount=1 TO 3
 120 PRINTTAB(0,count*7-2)"Interest"
 130 PRINT"Tot Paid":PRINT"Tot Int":PRI
NT"Balance"
 140 NEXT
 150 across=1:down=3
 160 FORcount=1 TO 12
 170 IFcount=20Rcount=50Rcount=80Rcount
=11int=bal*(rate/400) ELSE int=0
 180 totint=totint+int
 190 total=total+repay
 200 bal=bal-repay+int
 210 PRINTTAB(8*across+3,down)month$(co
unt)
 220 PRINT
 230 PRINTTAB(8*across,down+2)int
 240 PRINTTAB(8*across,down+3)total
 250 PRINTTAB(8*across,down+4)totint
 260 PRINTTAB(8*across,down+5)bal
 270 across=across+1
 280 IFcount=4 across=1:down=10
 290 IFcount=8 across=1:down=17
 300 IFbal<0 count=15
 310 NEXT
 320 PRINTTAB(5,24)"Press any key to co
ntinue";:A=GET
 330 UNTIL bal<0
 340 PRINTTAB(5,24)SPC(25)TAB(14,24)"LO
AN REPAID";:VDU7:A=GET
 350 END
 360 DEFPROCsetup
 370 DIMmonth$(12)
 380 FORcount=1 TO 12
 390 READmonth$((count+start)MOD12+1)
 400 NEXT
 410 totint=0:total=0:year=1
 430 ENDPROC
 440 DATAJan,Feb,Mar,Apr,May,Jun,Jul,Au
g,Sept,Oct,Nov,Dec
```

```
10 = F238 8 | 160 = F4E2 6 | 310 = 2C83 B
20 = 1AC3 6 | 170 = A16F 2 | 320 = C797 4
30 = 24EE F | 180 =  408 7 | 330 = 1A02 1
40 = 6282 2 | 190 = 9EE3 0 | 340 = 4B4D F
50 = 3F65 3 | 200 = 6218 0 | 350 = FD2E 5
60 = 5ADE C | 210 = 174A B | 360 = 2AA8 6
70 = A2C5 B | 220 = FF3E 0 | 370 = 7B27 C
80 = 81CC 5 | 230 = 7300 4 | 380 = F4E2 F
90 = BFBA 4 | 240 = 23CE 0 | 390 = BC7B A
100 = 1C6E B | 250 = ECC9 4 | 400 = 2C83 7
110 = BA82 A | 260 = 6722 6 | 410 = 9F88 0
120 =  509 7 | 270 = D979 C | 430 = ED0F 6
130 = 9816 A | 280 = D55E 6 | 440 = 9A6E E
140 = 2C83 C | 290 = A471 0
150 =  677 F | 300 = B971 B
```


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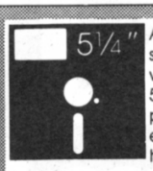

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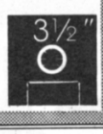

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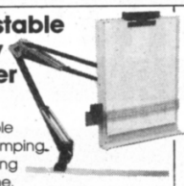

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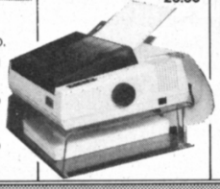

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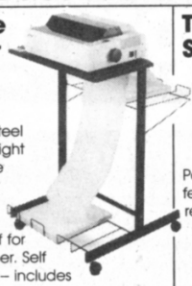

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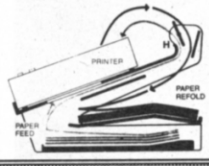

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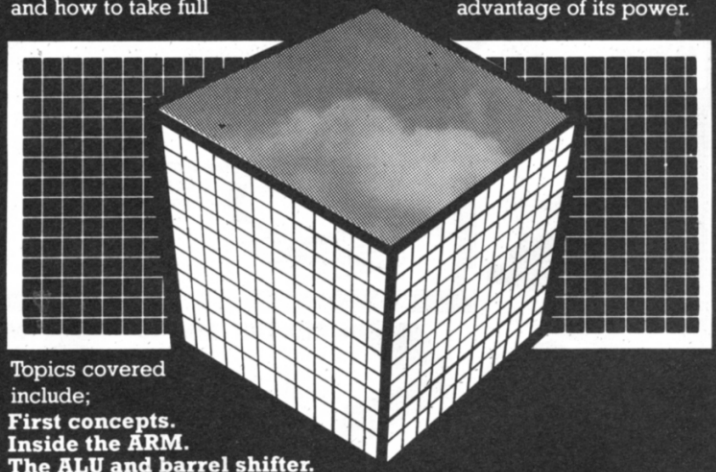
ARM Assembly language programming

By Peter Cockerell

This book describes in detail all aspects of programming the new Acorn Risc chip (generally referred to as the ARM). This 32-bit chip, on average 4 times faster than a 68000, will form the basis of a new generation of machines. The book explains why the chip is so fast and how to take full advantage of its power.



Topics covered include;

- **First concepts.**
- **Inside the ARM.**
- **The ALU and barrel shifter.**
- **The instruction set.**
- **Instruction timings.**
- **The BBC BASIC assembler.**
- **Assembly programming principles.**
- **Data structures.**
- **Non-user modes.**
- **Undefined instructions.**
- **Interrupts and vectors.**

The book is completely up-to-date covering only the new 2 micron ARM, with appendices on the floating point and co-processor instructions and with numerous example programs. A truly comprehensive reference manual for anyone who intends to program in ARM assembly language, or for those who just want to find out why the Acorn RISC chip is so special.

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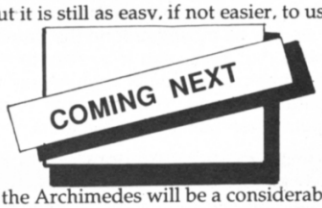
WORDWISE PLUS

This very popular successor to WORDWISE added many unique features to the original such as its programming language. Still popular today WORDWISE and WORDWISE PLUS have amassed combined sales of over 150,000 copies.

INTER-WORD

The current best seller for the BBC machine and part of the integrated suite of application ROMs. Further enhancements over WORDWISE include on screen styles, page layout, menus and multi-columns but it is still as easy, if not easier, to use than WORDWISE.

...and now for the Archimedes...



The new word processor for the Archimedes will be a considerable advance over any currently available word processor. More powerful than anything that has gone before, but still as easy to use as ever. See it for the first time at the PCW show at the end of September. Contact us for details of this and other Archimedes software.

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Paul Hendy looks at a desktop manager with a difference

Your wish is my command

EVERY so often a product is launched for the humble BBC Micro which so jolts the market that you are forced to sit up and take notice.

Such a product is Genie – a useful diary and management tool.

It's a small, flat, encapsulated plastic box about three inches square that plugs into a single rom socket. A very short disc program is run to initialise the package and is never used again.

Power consumption is quoted as being virtually comparable with a single rom, but inside the small plastic box sits 96k of memory, divided into three banks of 32k.

The first bank contains the controlling software, bank-switched so that it works on the ordinary BBC model B as well as the Master, B+ and Compact. The second bank of 32k acts as a memory store for data entered while in Genie.

Thus no access to disc or cassette ever needs to take place, and because of the battery back-up, the data is retained even after power switch off.

The third bank is extremely clever – it stores all the BBC memory. Genie itself needs to use some of the main computer ram, and to enable the package to be permanently resident, and accessible, the contents already in memory need to be protected.

Consequently Genie can be called from almost any software package, and after any work is completed, pressing Escape returns you to the place you were before Genie was called. I tried calling it from many packages, including Spellmaster going through a CHECK routine listing hundreds of words. It worked perfectly every time.

Genie can be summoned, not by rubbing the keyboard three times, but by pressing three keys simultaneously: Control+Shift+G. It is also possible to use *GENIE, but the key combination is much faster.

The screen then displays the opening menu. There is an unchanging colourful logo at the top and a function key display at the bottom which alters to show what operation each key will perform at various times.

There are nine main options which can be selected either by pressing the appropriate number, or by using the cursor keys to move a highlight bar. I'll take each of these options in turn:

The Address Book

This changes the Mode 0 screen to reveal a simple card index type database page, with five fields for surname, forenames, address, telephone, and details. The left-hand portion of the screen indicates six options, of which two, calendar and calculator, will be dealt with later.

The other four allow various operations to be carried out. They are Browse, Work, Find, and Print labels and are largely self-explanatory.

Browse allows forward and backwards movement through the entries, which are automatically indexed in surname order, no matter how they were entered. Work allows editing on the entries, using the normal cursor editing keys and the red keys which by now have been redefined for the purpose.

Find will search for any string, anywhere in the record. Thus you may look for anybody living in Leeds without worrying about whether this part of the address occurred in the third or fourth line of the address field.

The find routine is not case sensitive. "Print label" does exactly that. It prints the name and address, and then generates line feeds on the printer to make the printouts 1.5 inches apart, the normal spacing for labels.

Calender

The Calendar reveals the current month with the cursor block on the current day. This may be moved around the dates via the cursor keys, and it is easy to move forwards/backwards a month/year with fantastic speed. This calendar is seen again when using the desk diary.

Calculator

Selecting the Calculator reveals a further set of three options: Calculator, conversion chart, and Ascii table. At first I assumed the last two had been inserted simply to fill up a bit of rom room.

They are actually quite useful, the unit conversion chart indicating the mathematical functions needed to convert temperature, weights, lengths, and volumes from metric to imperial. The Ascii chart simply displays all the Ascii characters from 0-127.

The calculator itself is very neat. The usual facilities of memory, percent, square root, cancel last entry, and so on, are present, and a clever touch is the trapped wrong key-press.

To subtract five from seven you can either press the minus key (below the equals sign) or the underline key (below the pound sign). This shows that a good deal of care and thought has gone into the planning of the system.

Desk Diary

I think that the most useful part of Genie is the Desk Diary. The screen changes to reveal an area for making diary entries, and like the address book you can select Browse, Work, or Print, but this time it's Print Page rather than Print Label.

Using the cursor keys will enable you to move forwards and backwards through the diary, but an easier method is to press f0 which will reveal the calendar for the month. Any dates that have entries are highlighted, and the cursor block can be moved to one of these to reveal the entry for that day.

The area for diary entries (10 lines by 34 characters) is large enough for most purposes, and a nice feature about being able to move year by year using the cursor keys with Shift means that you can at a glance check on what day a particular date occurs for subsequent years.

Notepad

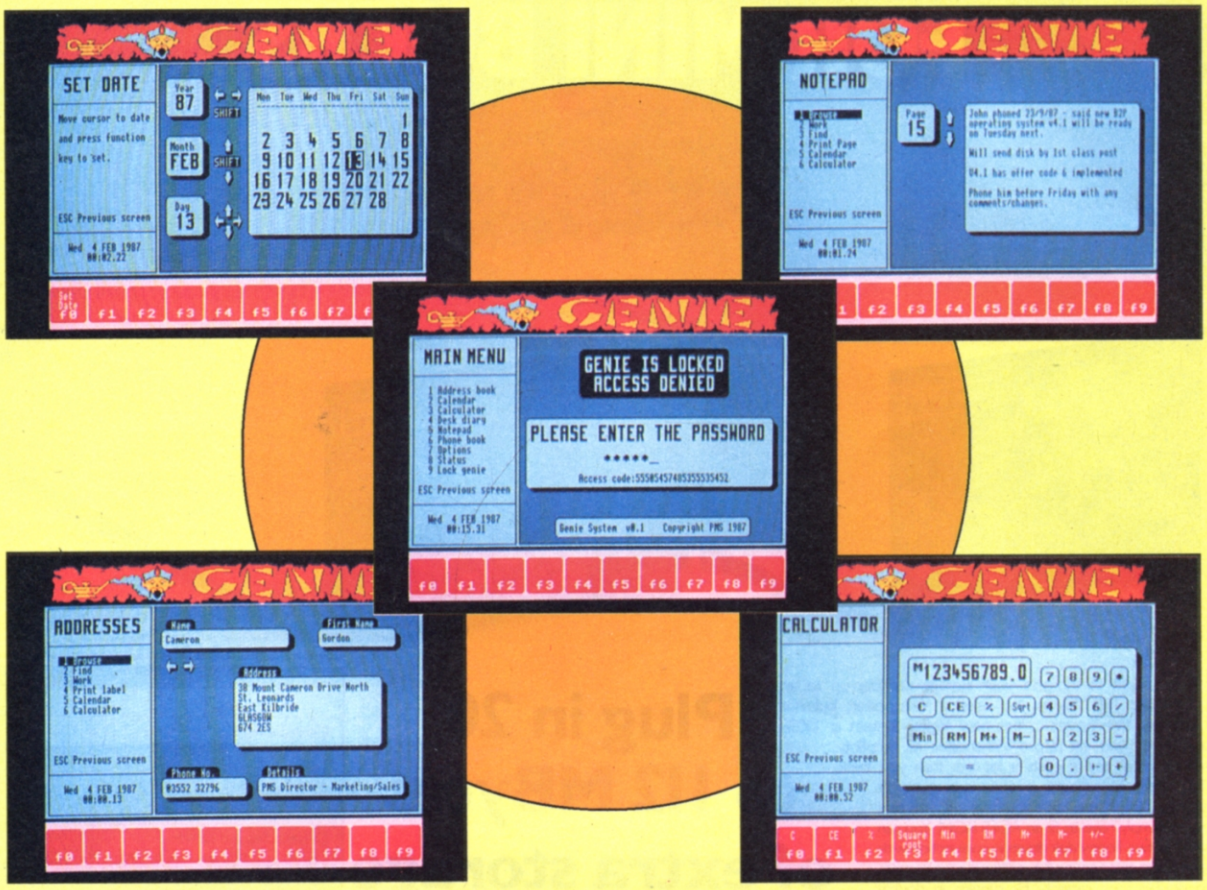
The Notepad allows jottings to be entered and stored. Like the desk diary there are options for Browse, Work, and Print Page, and there is also the facility to find a particular string.

The notes are held in pages, each 16 lines by 40 characters, and Browse allows you to move forwards/backwards through the pages. Once more the function keys alter at various times to give extra commands and the notepad concept proved extremely useful while writing this review.

As text was being entered in InterWord, new ideas and comments that needed to be remembered could be jotted down on the notepad ready for recall and printing later.

Phone Book

The Phone Book is derived from the



address book and displays a list containing surname, forename, and telephone number. Scrolling is achieved via the cursor keys, using Shift to move through the list at great speed.

Options

There is a general Options function which gives a further choice of six actions:

- Set Date – to set the current date for the system. Because the BBC model B has no internal real time clock, this date must be set each day you use Genie, but it literally only takes a couple of seconds to accomplish, on the Master the time and date are adjusted from the real time clock.

There is actually a clock on the Genie display, but if you have no real time clock capability, this reveals the amount of time elapsed.

- Date stamp – within the notepad it is possible to have the current date automatically entered at the top of each Notepad page using this option.
- Interlace on/off – depending on your monitor, you may find that the display jitters slightly. Good software packages, like Inter-Word and Genie, allow you to switch the interlace on/off to correct this.
- Set ink colour and set paper colour – these two commands allow the colours of the background and foreground to be altered for personal taste, and to improve contrast on monochrome monitors.
- Set password – Genie can be password protected, so that when exited, nobody can then enter and read the data without the password.

There is the facility for saving and loading the Genie data to disc as a final backup in case the on board ram backup battery begins to fail, and even this is stored in a garbled form for security.

- Lock Genie – protects your Genie from unauthorised entry.

The Status option tells you how much memory has been used by the system. It is detailed for the notepad, address book, and diary, showing the number of entries made, and the bytes used.

Among the associated * commands with Genie are two, *GENIE ON/OFF, to enable it to be turned on or off. The manual states that this is to cater for certain games software that do not allow other systems to claim the keyboard vector.

*GBACKUP O/I will either output or input the Genie data to/from disc. This acts not only as a backup system but also as a means where different sets of diary entries/jottings/addresses could be stored and loaded as required.

There are always things that could be added, among them being the facility to import and export data, to a word processor and PMS are bringing out a disc of Genie utilities for this very purpose.

The system is stunningly simple to use, and after a brief amount of experimentation with the cursor keys, the easy-to-read manual is only really needed to give reminders of the * commands.

Genie is neat, well packaged, well-written, and fills a clearly identified gap in the BBC Micro software market.

Product: Genie
Price: £79.35
Supplier: Permanent Memory Systems, 38 Mount Cameron Drive, East Kilbride G74 2ES.
Tel: 03552 32796

MEGA BYTES FOR MINI BUCKS

Picture shows 20 and 28 megabyte units. 40 and 56 megabyte units may be slightly taller in size.

Plug in 20 to 112 MBytes of extra storage with the Viglen Winchester System

If you want to increase your storage capacity up to an incredible 112 MBytes you need a Winchester; but not just any Winchester ... the new Viglen System is 100% compatible with the Acorn Winchester, it's simplicity itself to install and it costs a lot less than you think.

The Viglen Winchester is ready to plug straight into your BBC Master or if you have a B or B plus you will simply have to fit an ADFS ROM. You can use up to two floppy disk drives in conjunction with the unit and, fitted to the B+ or Master, the floppies can double their capacity by running in double density mode.

The 112 MBytes Viglen Winchester System is equivalent in capacity to over 1000 100K floppies or 250 400K floppy disks. It takes under 2.5 seconds to save 200K bytes, making it at least ten times faster than the equivalent floppy disk options. The system is designed for virtually every application from education or business to home use.

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Acorn ADFS ROM with utilities (essential for BBC B and B Plus)	29.95
Acorn 1770 upgrade kit (BBC B)	49.95

WHAT DO I GET FOR MY MONEY

1. Winchester Unit – (winchester drive, controller boards, power supply and fan all fitted in one compact case). The fan is recommended in order to keep the winchester at the correct operating temperature.
2. Master Reference manual part 1 (for a BBC B or B plus you will require the Acorn ADFS ROM and utilities available at an extra cost).
3. Winchester user guide.
4. Additional utilities on the winchester including formatter, verifier, ADFS menu and backup program.

PLUG IN SECOND DRIVE

The Acorn ADFS can handle up to two winchester drives. These are accessed as drive 0 and 1 (the floppy disk drives being accessed as drives 4 and 5). Viglen winchesters are supplied as Drive 0 (single unit) and Drive 1 (Second drive for single unit). The Viglen drive 1 can be instantly plugged into drive 0 and used either as a backup for Drive 0 (and perhaps taken off and stored away) or for more online mass storage. This will enable you to back up 20 Megabytes in under 7 minutes.

STORAGE OPTIONS:-

Drive 0	Drive 1	Total Capacity
20 Meg	20 or 40 Meg	40 or 60 Meg
28 Meg	28 or 56 Meg	56 or 84 Meg
40 Meg	20 or 40 Meg	60 or 80 Meg
56 Meg	28 or 56 Meg	84 or 112 Meg

COMPATIBILITY?

Viglen winchesters are 100% compatible with the Acorn winchesters and the ADFS. Any program that will run on the Acorn winchester will also run on the Viglen winchester. The winchesters also run with the Acorn Master 512 board with DOS plus (CPM86 and MSDOS compatible operating system).

BACK OF UNIT

1 MHz IN: This socket is used to connect the micro to the winchester.
1 MHz OUT: This socket is used to connect any other device that is normally plugged into the 1 MHz bus on the micro.
DRIVE 1 DATA: This is a 20 way socket which is used to connect the data signals to a second winchester drive.
DRIVE 1 CONTROL: This is a 34 way socket which is used to connect the control signals to a second winchester drive.

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Simply write off today to Viglen and remember to add £8.00 carriage, packing and insurance, and allow 7 days for delivery. Credit card holders may order by telephone. If you'd like to find out more why not come down to our West London showroom (see map for directions) or if you can't make it simply ask for our special datasheet.

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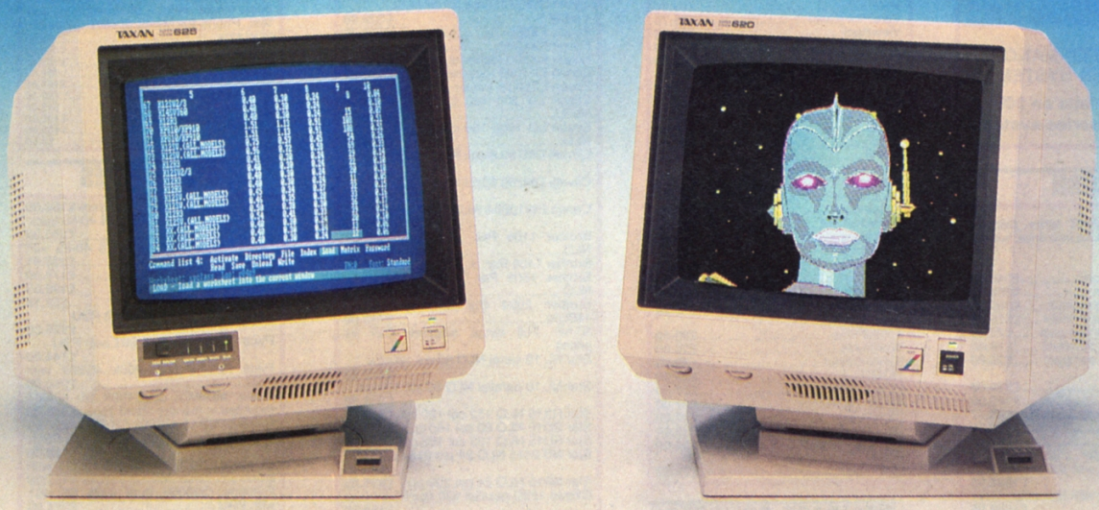

The top of the range Supervision 625 and its baby brother, the 620

DA VINCI, Degas, Dean – could you use your BBC Micro to create works or art? Or would you like to see your poster or page designs displayed to the best effect? For the best images you need a high resolution colour monitor.

THIS is your opportunity to use your programming design skills to win the superb Supervision 625 from Taxan. This 12in RGB colour monitor has a 668 x 312 line resolution, positive or negative sync output, text colour switchable to green, amber white reverse or white on blue, illuminated front panel test mode selector, more than 18 MHz bandwidth and a super high contrast tube. With all these features it's no surprise that it's worth £527.

What to do

In this issue of *The Micro User* you will find the listing for the Microworks Screen Designer program. This introductory art package has been written so that you can adapt it for your needs – you could add a flood fill routine or write a routine to use a mouse.

What we want you to do is supply the original program on disc with the addition of new routines and any necessary documentation. Enclose this with the coupon below and ensure that we receive your entry no later than October 31.

The winner of Taxan's Supervision 625 will be the person who, in the opinion of the judges, supplies the best new routines for Microworks.

ENTRY FORM

Name .....

Address.....

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.....*Postcode*.....

I certify that this is all my own work .....

Signature

Send to: ***Microworks Competition,*** **The Micro User,**
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Mend & Overhaul Tracks

Call at Chris Nixon's service station and give your well worn discs a new lease of life

HERE is a utility which will try to rescue your discs from the dreaded "Disc fault" errors resulting from using old, damaged or corrupted discs.

MOT is totally dedicated to patching up your worn out or corrupted discs and data. There is no disc that cannot be repaired unless it is physically damaged rendering the actual surface unusable.

What MOT does is to reformat a disc completely while preserving data that can be recovered. A disc treated in this way is as magnetically fresh as the day it was first formatted, and any sectors that were unreadable are patched up automatically with blank data.

There are two possible uses for the program. The first is preventative treatment for all your most valuable discs every 6 to 8 months or so. This will keep the data fresh for as long as the disc surface remains physically intact – which should be many years with care.

MOT's second function is as a cure for discs rendered unreadable because the magnetic signals have weakened through age until they are below the readable threshold of the floppy disc controller – FDC – chip.

It only takes a sector's ID header to become too weak for the whole of that sector to become unreadable, the result being the message:

```
Disc fault (number) at (track),(sector)
```

If you receive this message a quick service is indicated.

To use the program, type in the listing, check it with the checksums and save it with a suitable file name other than MOT. Now run the program and the code will be assembled and saved as MOT.

Try out the program on a backup or unimportant disc first, not on an important one just in case you've made a fatal typing error.

The newly-created file can be *RUN and you are asked:

```
40 or 80 tracks (4/8)?
```

Select according to the type of drive you've got.

Next you are prompted to enter the drive number to use for the repair. Only numbers from 0 to 3 will be accepted. The repair starts immediately, so if you only have a single drive make sure the disc containing MOT has been removed before you type the drive number.

No harm would result by forgetting to do this, but you would have to wait for MOT to finish processing the disc before trying again.

You must never abort MOT halfway through a disc repair by pressing Break because the program could be halfway through formatting a track at the time resulting in loss of data.

MOT treats your disc as follows: Attempt to load a complete track into the buffer. If unsuccessful try each sector in turn to identify which is at fault and fill the corresponding part of the buffer with 256 bytes of &E5, and then increment

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◀ *From Page 69*

the sector's patched counter. Now format the track.

Finally try to save the buffer back to the track. If unsuccessful for any reason abort with the message *Fatal disc error found* because the disc surface must be physically damaged if it prevents the saving of data on to a freshly formatted track.

You can tell when MOT has found a dodgy track because the sector number displayed in the centre of the screen starts to climb.

Any sectors that do need patching will be filled with blank data as part of the process and if this occurs halfway through a Basic or machine code program then they may be rendered unusable. No apologies are made for this as the data was unreadable anyway and MOT would have to be psychic to be able to restore the lost data.

If the program aborts with the fatal error message you should salvage all the uncorrupted programs and throw the disc away. Even if only one sector is causing the problem it is symptomatic of the rest of the disc following the same path sooner or later.

MOT will work on any of the BBC series machines in DFS mode because all the 8271 FDC functions are emulated by the 1770 FDC software.

Finally, remember what your dentist is always fond of telling you: Don't wait till it's too late. Prevention is always better than cure. With a regular MOT all your floppies should enjoy an extraordinarily long and healthy life.

```
 10 REM *************************
 20 REM *  Disc MOT Version #1  *
 30 REM * for any 8271/1770 DFS *
 40 REM *    by Chris Nixon     *
 50 REM *       Oct 1987        *
 60 REM *  (c) The Micro User   *
 70 REM *************************
 80 REM
 90 MODE7:HIMEM=&3FFF
100 mess=&70:memory=&72:fields=&5000
110 FORPASS=0TO2STEP2
120 P%=&4000
130 [OPT PASS
140 LDA #title MOD 256:STA mess
150 LDA #title DIV 256:STA mess+1
160 JSR message
170 .discloop
180 LDA #trackmess MOD 256:STA mess
190 LDA #trackmess DIV 256:STA mess+1
200 JSR message
210 .get1
220 JSR &FFE0:BCS escape:CMP #52
230 BEQ track40:CMP #56:BNE get1
240 JSR &FFEE:LDA #79:STA maxtrack
250 JMP getdrive
260 .track40
270 JSR &FFEE:LDA #39:STA maxtrack
280 JMP getdrive
290 .escape
300 LDA #126:JSR &FFF4:JMP &FFE7
310 .getdrive
320 LDA #48:JSR &FFEE
330 LDA #discmess MOD 256:STA mess
340 LDA #discmess DIV 256:STA mess+1
350 JSR message
360 .get2
370 JSR &FFE0:BCS escape:CMP #52
380 BCS get2:JSR &FFEE:SEC:SBC #48
390 STA drive:JSR enforce:BCC report
400 LDA #fatalmess MOD 256:STA mess
410 LDA #fatalmess DIV 256:STA mess+1
420 JSR message:JMP ask
430 .report
440 LDA #reportmess MOD 256:STA mess
450 LDA #reportmess DIV 256:STA mess+1
460 JSR message:LDA fixnum:JSR hex
470 .ask
480 LDA #moremess MOD 256:STA mess
490 LDA #moremess DIV 256:STA mess+1
500 JSR message:JSR &FFE0:BCC ok
510 JMP escape
520 .ok
530 AND #223:CMP #ASC"Y":BNE quit
540 JMP discloop
550 .quit
560 LDA #resmess MOD 256:STA mess
570 LDA #resmess DIV 256:STA mess+1
580 JMP message
590 .message
600 LDY #0
610 .messloop
620 LDA (mess),Y:CMP #42:BEQ exitmess
630 JSR &FFE3:INY:JMP messloop
640 .exitmess
650 RTS
660 .enforce
670 LDA #fixmess MOD 256:STA mess
680 LDA #fixmess DIV 256:STA mess+1
690 JSR message
700 LDA #0:STA track:STA fixnum
710 .trackloop
720 JSR readtrack:BEQ nexttrack
730 JSR checktrack
740 .nexttrack
750 JSR formattrack:JSR writetrack
760 BEQ trackOK:SEC:RTS
770 .trackOK
780 INC track:DEC maxtrack
790 BPL trackloop:CLC:RTS
800 .tab
810 LDA #31:JSR &FFEE:TXA:JSR &FFEE
```

This is one of hundreds of programs available FREE for downloading on

MicroLink

In addition to these many BBC Micro programs in the MicroLink library will also run on the Electron.

```
820 TYA:JMP &FFEE
830 .readtrack
840 LDX #17:LDY #10:JSR tab:LDA track
850 JSR hex:LDX #28:LDY #10:JSR tab
860 LDA Tblock+8:JSR hex
870 LDA drive:STA Tblock:LDA #&53
880 STA Tblock+6:LDA track
890 STA Tblock+7:LDA #0:STA Tblock+8
900 JMP Tosword
910 .writetrack
920 LDA #&4B:STA Tblock+6
930 LDA #0:STA Tblock+8
940 .Tosword
950 LDA #&7F:LDX #Tblock MOD 256
960 LDY #Tblock DIV 256:JSR &FFF1
970 LDA Tblock+10:RTS
980 .checktrack
990 LDA track:STA block+7:LDA #0
1000 STA sector
1010 .sectorloop
1020 LDX #28:LDY #10:JSR tab:LDA sector
1030 JSR hex
1040 LDA drive:STA block
1050 LDA #0:STA block+1
1060 LDA #&20:STA block+2
1070 LDA #&53:STA block+6
1080 LDA sector:STA block+8
1090 LDA #&7F:LDX #block MOD 256
1100 LDY #block DIV 256:JSR &FFF1
1110 LDA block+10:BEQ nextsector
1120 JSR newsector
1130 .nextsector
1140 INC block+2:INC sector
1150 LDA sector:CMP #10
1160 BCC sectorloop:RTS
1170 .formattrack
1180 LDX #0:LDY #0
1190 .idloop
1200 LDA track:STA fields,X:LDA #0
1210 STA fields+1,X:TYA:STA fields+2,X
1220 LDA #1:STA fields+3,X:INX:INX:INX
1230 INX:INY:CPY #10:BCC idloop
1240 LDA drive:STA format:LDA track
1250 STA format+7
1260 LDA #&7F:LDX #format MOD 256
1270 LDY #format DIV 256:JMP &FFF1
1280 .newsector
1290 LDA #patch MOD 256:STA mess
1300 LDA #patch DIV 256:STA mess+1
1310 LDA block+1:STA memory
1320 LDA block+2:STA memory+1:LDY #0
1330 .patchloop
1340 LDA (mess),Y:STA (memory),Y
1350 INY:BNE patchloop:INC fixnum:RTS
1360 .hex
1370 STA num
1380 ROR A:ROR A
1390 ROR A:ROR A
1400 JSR print
1410 LDA num
1420 JSR print
1430 RTS
1440 .print
1450 AND #15:STA temp
1460 CMP #10:BCS alpha
1470 CLC:LDA #48
1480 ADC temp:JSR &FFEE
1490 RTS
1500 .alpha
1510 CLC:LDA #55
1520 ADC temp:JSR &FFEE
1530 RTS
1540 .temp:BRK
1550 .num:BRK
1560 .track:BRK
1570 .sector:BRK
1580 .drive:BRK
1590 .fixnum:BRK
1600 .maxtrack:BRK
```

```
 1610 .patch:OPT FNblanks
 1620 .title
 1630 OPT FNequb(22):OPT FNequb(7):OPT F
Nequb(31):OPT FNequb(6):OPT FNequb(0)
 1640 OPT FNequb(141):OPT FNequb(129):OP
T FNequb(157):OPT FNequb(131)
 1650 OPT FNequs("DISC MOT Version 1 ")
 1660 OPT FNequb(156):OPT FNequb(31):OPT
 FNequb(6):OPT FNequb(1)
 1670 OPT FNequb(141):OPT FNequb(129):OP
T FNequb(157):OPT FNequb(131)
 1680 OPT FNequs("DISC MOT Version 1 ")
 1690 OPT FNequb(156):OPT FNequb(31):OPT
 FNequb(2):OPT FNequb(2):OPT FNequb(134)
 1700 OPT FNequs("By Chris Nixon - (c) T
he Micro User")
 1710 OPT FNequb(28):OPT FNequb(0):OPT F
Nequb(24)
 1720 OPT FNequb(39):OPT FNequb(4):OPT F
Nequb(42)
 1730 .trackmess
 1740 OPT FNequb(12):OPT FNequs("40 or 8
0 tracks (4/8)?"):OPT FNequb(134):OPT FN
equb(42)
 1750 .discmess
 1760 OPT FNequw(&0D0D):OPT FNequs("Inse
rt a disc & enter its drive no:"):OPT FN
equb(134):OPT FNequb(42)
 1770 .fixmess
 1780 OPT FNequb(31):OPT FNequb(0):OPT F
Nequb(10):OPT FNequb(129)
 1790 OPT FNequb(157):OPT FNequb(131)
 1800 OPT FNequs("Fixing Track:_ "):OPT
 FNequb(131):OPT FNequs("Sector:_00"):OP
T FNequb(42)
 1810 .fatalmess
 1820 OPT FNequb(7):OPT FNequb(31):OPT F
Nequb(0):OPT FNequb(17)
 1830 OPT FNequb(129):OPT FNequb(157):OP
T FNequb(131)
 1840 OPT FNequs("Fatal disc error found
 ")
 1850 OPT FNequb(156):OPT FNequb(42)
 1860 .reportmess
 1870 OPT FNequb(7):OPT FNequb(31):OPT F
Nequb(0):OPT FNequb(17)
 1880 OPT FNequs("No. of sectors patched
:"):OPT FNequb(134):OPT FNequb(42)
 1890 .moremess
 1900 OPT FNequb(13):OPT FNequb(31):OPT
 FNequb(0):OPT FNequb(19)
 1910 OPT FNequs("Fix another disc (Y/N)
?")
 1920 OPT FNequb(42)
 1930 .resmess
 1940 OPT FNequb(28):OPT FNequb(0):OPT F
Nequb(24):OPT FNequb(39):OPT FNequb(0)
 1950 OPT FNequb(13):OPT FNequb(42)
 1960 .Tblock
 1970 OPT FNequb(0):OPT FNequd(&2000):OP
T FNequb(3):OPT FNequb(0)
 1980 OPT FNequw(0):OPT FNequw(&2A)
 1990 .block
 2000 OPT FNequb(0):OPT FNequd(&2000):OP
T FNequb(3):OPT FNequb(&53)
 2010 OPT FNequw(0):OPT FNequw(&21)
 2020 .format
 2030 OPT FNequb(0):OPT FNequd(fields):O
PT FNequb(5):OPT FNequb(&63)
 2040 OPT FNequb(0):OPT FNequb(21):OPT F
Nequb(&2A):OPT FNequb(0)
 2050 OPT FNequw(16)
 2060 ]
 2070 NEXT:$&B00="SAVE MOT 4000 "+STR$~P
%:X%=0:Y%=&B:CALL&FFF7
 2080 END
 2090 DEF FNblanks
 2100 FORL%=0 TO &FF STEP4
 2110 [OPT PASS
 2120 OPT FNequd(&E5E5E5E5)
 2130 ]:NEXT
 2140 =PASS
 2150 DEF FNequb(N%)
 2160 ?P%=N%:P%=P%+1
 2170 =PASS
 2180 DEF FNequw(N%)
 2190 ?P%=N% MOD 256
 2200 ?(P%+1)=N% DIV 256
 2210 P%=P%+2
 2220 =PASS
 2230 DEF FNequd(N%)
 2240 !P%=N%:P%=P%+4
 2250 =PASS
 2260 DEF FNequs(N$)
 2270 FORL%=1 TO LENN$
 2280 P%?(L%-1)=ASC(MID$(N$,L%,1))
 2290 NEXT:P%=P%+LENN$
 2300 =PASS
```

This listing is included in this month's tape & disc offer. See order form on Page 141.

Get it right!

```
 10 =     0 0
 20 =     0 0
 30 =     0 0
 40 =     0 0
 50 =     0 0
 60 =     0 0
 70 =     0 0
 80 =     0 0
 90 = 6CEC C
100 = 6EB1 E
110 = 4A5B 7
120 = 68B0 2
130 = DD44 D
140 = D952 2
150 = 690F 8
160 = CD92 C
170 = 76C3 1
180 = FA52 4
190 = 3ABA 2
200 = CD92 A
210 = 5D97 C
220 = 7195 A
230 = 4322 C
240 =  EC4 A
250 = 89C6 5
260 = 8B19 3
270 = 9576 3
280 = 89C6 8
290 = E93C 5
300 = DED2 A
310 = B36A 3
320 = BE6B 5
330 = A293 8
340 = 74C1 C
350 = CD92 4
360 = 6DF4 A
370 = 7195 D
380 = FAB6 6
390 =  5B7 B
400 =  F67 F
410 = B078 8
420 = 72E5 A
430 =  D2E 2
440 = 6FB8 0
450 = 81C0 3
460 = A19A 2
470 = B988 8
480 = CB0E 0
490 = 9767 A
500 = 6196 1
510 = F7E1 9
520 = 5B1E 8
530 = F6F3 0
540 = 4C6F E
550 = 4F84 5
560 = E478 0
570 = 9FEE A
580 = A697 5
590 = 8868 3
600 = 9CF1 B
610 = 79FB 4
620 = 9EBA C
630 = 7C4A 8
640 = 860A 4
650 = 9843 E
660 = 7D08 E
670 = B5DE B
680 = 774C B
690 = CD92 3
700 = 26F1 3
710 = A3FE 9
720 = C2D1 2
730 = FE03 9
740 =  E2E D
750 = F600 C
760 = 6258 4
770 = 9046 C
780 = B33B A
790 = 5D51 7
800 = E523 6
810 = FC74 8
820 = 18C9 8
830 = EEF3 8
840 = DB9D 7
850 =  A70 E
860 = 2E6C 5
870 =  586 8
880 = 73D8 C
890 =  4FA E
900 = 6F83 6
910 = CEBA E
920 = 9984 C
930 = 4DA8 C
940 = 417C 0
950 = 8633 4
960 = 5343 E
970 = 4433 A
980 = F454 6
990 = E0F7 7
1000 = 2A8E 1
1010 = 1FEA E
1020 = 3F35 1
1030 = CFA3 B
1040 = B43F 1
1050 = 5425 8
1060 = 2CEA 6
1070 = D3CD B
1080 = 434C 6
1090 = 60FC 9
1100 = 3027 B
1110 = 802A 4
1120 = 5D14 3
1130 = DD8B 5
1140 = 7680 E
1150 = 95A1 7
1160 = A30D E
1170 = 969F A
1180 = F48E F
1190 = 1F67 8
1200 = EA9C 8
1210 = 3E6F A
1220 = 3D6B 2
1230 = 4B9A A
1240 =  950 D
1250 = 607F 8
1260 = AB98 A
1270 = 3DC6 9
1280 = E178 E
1290 = 536D 6
1300 = 5AE0 2
1310 = DA67 3
1320 = ECEC 6
1330 = 6ADE 3
1340 = 5EE9 0
1350 = 7CF6 C
1360 = AC9E 1
1370 =  29A 7
1380 = 6DB5 7
1390 = 6DB5 C
1400 = AD7B 6
1410 = A58C 8
1420 = AD7B 0
1430 = 9843 B
1440 = 14FC 8
1450 = B6EC 5
1460 = 5807 8
1470 = C2AB 7
1480 = 926B 6
1490 = 9843 B
1500 = 36CA F
1510 = 2037 5
1520 = 926B 3
1530 = 9843 5
1540 =  B77 7
1550 = FC2D A
1560 = C13A A
1570 = 7D2E 8
1580 = 9744 4
1590 = 4CD3 3
1600 = 6D5F 3
1610 = EB69 3
1620 = FD02 3
1630 = D52D D
1640 = A23A F
1650 = F856 9
1660 = E4AE B
1670 = A23A 2
1680 = F856 4
1690 = DEDF 2
1700 = 97FA 7
1710 = 2D37 2
1720 = 4C1A 6
1730 = 64F6 7
1740 = BAB2 7
1750 = B1CB B
1760 = 95D6 5
1770 = FC26 1
1780 = B3DF 0
1790 = EDDE 3
1800 = CF25 5
1810 = A6E6 4
1820 = F789 A
1830 = 1356 A
1840 = DE0F 6
1850 = D5D2 8
1860 = A770 3
1870 = F789 B
1880 = 9704 D
1890 = C1C2 0
1900 = 6C79 2
1910 = E5FB 5
1920 = 5301 F
1930 = ED87 F
1940 =  30B 0
1950 = CB56 1
1960 = 551A 7
1970 = F137 C
1980 = 4424 7
1990 = CAFA 4
2000 = 89F5 A
2010 = 4C7D 6
2020 = 828D F
2030 = 5B33 9
2040 = 2A73 8
2050 = 5338 F
2060 = 8B58 F
2070 = 1F40 0
2080 = FD2E 0
2090 = E280 C
2100 =  27B 5
2110 = DD44 6
2120 = D3C7 F
2130 = DA42 4
2140 = 4348 C
2150 = 54D3 A
2160 = 21E0 A
2170 = 4348 F
2180 = 73DE 4
2190 = BC53 8
2200 = 3577 C
2210 = 650A F
2220 = 4348 A
2230 = 9956 D
2240 = 57BE 6
2250 = 4348 5
2260 = C9E9 4
2270 = EC82 A
2280 = 8C53 4
2290 = E2A7 8
2300 = 4348 4
```

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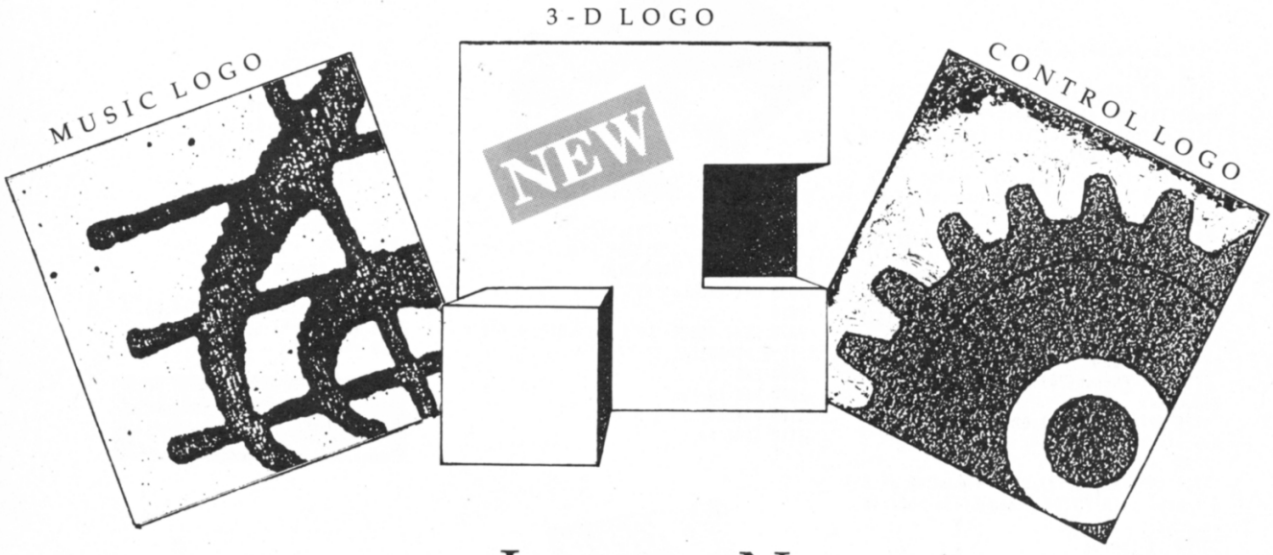

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Interactive video to be evaluated

WORK on evaluation of the major new experiment in high tech education, the Interactive Video in Schools (IVIS) project, is expected to begin in the new year.

The flexibility of the BBC Micro and its presence in almost all British schools made it the natural choice for the project.

Interactive video (IV) increases the scope of a user's on-screen manipulations, using the computer to control the sequence of action on a laser video player.

Arcade laser games like Dragon's Lair used early versions of this technology, allowing players to control an animated adventure. IV has come a long way since then.

The Domesday Project, a modern update of William the Conqueror's survey of his newly acquired Britain, chronicles huge portions of life and culture in today's UK.

The massive video library, conceived years ago by a BBC producer to celebrate the 900th anniversary of the original Domesday Book, gave impetus for new hardware and software developments forging the links between the computer and laser disc player.

It also pushed educators, producers and computer programmers into thinking of ways this powerful medium could be worked into the classroom.

As reported in the June issue of *The Micro User*, the Department of Trade and Industry has invested £1.5 million into the IVIS project so that eight teams around the UK could produce video lessons and the programming to control them.

"We picked the BBC Micro for our control system because of the number of them already integrated into the school curriculum", said Sophie Harding, an administrator at IVIS whose own program, The Geography Disc, helps to teach hydrology, weather and issues in third world development.

Most of the eight discs have been completed and await final refinement before they can go into schools for piloting.

"A huge amount of time and thought has been put into all eight productions", says Harding. "Corporations and libraries have donated archival footage. Actors, directors and animators have produced first rate new films".

What makes these programs more extraordinary is the power the BBC Micro gives the teacher and the student over the characters, the action and the direction of what is unfolding on the screen.

One example is the modern languages project in Shropshire which uses linear tracking, a sophisticated version of story pathway control, to take a student on a shopping trip through a French town.

Using simple commands, students walk through animated streets into stores where live action shopkeepers ask them questions which they must answer in French.

A Life and Energy disc, created by Bulmershe College in Reading and the Open University, teaches students the profound effects of solar energy on the environment.

Animated narrators take them through normally difficult-to-reach landscapes and give them step by step instructions for laboratory experiments. The results can be fed into the BBC Micro for analysis and integration with video narration.

IV, could represent the biggest innovation in teaching technology since the computer first entered the classroom.

For students it is a whole new range of images to explore on the screen in interesting new ways.

For the teacher, the micro-video combination could replace the entire cannon of classroom AV tools, allowing instructors to program demonstration and visual lectures, mixing mediums and presenting pictures in their own choice of order.

Testing and piloting will take place in 92 schools until the end of the year. Then an evaluation group – the Centre for Applied Research in Education (CARE) – at the University of East Anglia, will see how well the system worked in the field.

If it is all as successful as preliminary use indicates, the next step will be for hardware and software producers to release commercial discs and consider schemes to get their equipment into the schools over the next decade – in the same way that the BBC Micro entered schools earlier.

John Haber

DTP goes to school

MORE than 250 pupils at the Bransholme high school in Hull are learning about the intricacies of desktop publishing with the help of a BBC Micro and AMX Stop Press.

Dorian Goring, who is head of communications at the school, first became interested in DTP last year after reading an article in *The Micro User*. "I was so inspired by the article that I ran to the nearest stockist and bought a

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EDUCATION NEWS

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copy of the AMX package", he said.

"After using it for a while I realised the great educational value of the medium and started a project at the school last December".

Until then the media studies class had only talked about the theory of how newspapers and other publications went together.

Dorian's excitement for DTP spread very quickly to the children, no sooner had he got the BBC Micro set up with Stop Press than they were clamouring to use the system.

Groups of 25 pupils at a time take part in the DTP classes in which they learn about everything from gathering and writing news stories to photography and how newspapers are printed.

"The response from the pupils has been tremendous", said Dorian. "Quite a few of the children have become so involved with DTP that they have expressed a desire to enter publishing when they leave school".

As part of the research for the course a survey was carried out of the teenagers' reading matter. Once their favourite reading materials had been identified the best parts of each publication were used as examples when preparing the school magazine.

Surprisingly, the most popular publication the pupils bought regularly was not the usual teenagers magazines but the Today newspaper.

Even before desktop publishing was taught at the school, pupils were encouraged to draw lines down the centre of their exercise books and write their essays in two columns.

"The idea behind this", says Dorian, "was to get children to think about formatting a page in a newspaper type fashion".

Newspaper emulations using AMX Stop Press

Early learning

TWO new educational packages for the BBC Micro which work with the Concept keyboard have been released by Chalksoft (0775 69518).

The first – Movaword – has been designed for children within the age range of four to seven who are just learning to read.

Numbers and Pictures is a maths activity game for children from four to six years of age which contains exercises with numerals up to the number nine. Price £13.00

Mind that child

Marshall Anderson explains what you need to know about educational software

IT'S been a long time since any of us believed manufacturers who claimed that we could run our central heating off their latest 16k micro or that we couldn't run normal household accounts without the aid of twin floppies and a printer.

All the time people are joining the rapidly less exclusive computer club and for more rational reasons. One of the most popular reasons goes right to the heart with advertisers pushing the seemingly logical: "If you don't buy our machine your child will spend its life sweeping floors or worse."

Now, with the central heating and household accounts myth you had little to lose. The overdraft will eventually be cleared and the electricity board will forgive you for fusing the entire street. But if the hardware and software manufacturers' claims for educational computing are as wrong then the damage will be harder to spot and more far reaching.

I am not suggesting for a moment that the computer has no place in education and the government has many different reasons for funding micros in schools. At least one of them contains educational considerations and when they spend money like that there's got to be something in it.

Although a majority of schools use computers in their curriculum they are by no means agreed on exactly how this should be done. In fact many have little if any computer policy.

There's nothing particularly horrific about that – education is continually experimenting with new methods. The fruits of this experimentation are beginning to appear in the form of training for teachers and resource centres but there's still a long way to go.

Along with all this work on the use of computers in school there has been a noticeable absence of advice to parents on how children should use them at home and I hope this article will go some way to correcting that.

One thing everyone agrees is that wrong help is worse than no help at all. Many children waste a lot of time in school unlearning the 'wrong stuff' before they can start to learn the 'right stuff'. The first rule to home education is: "Just 'cos they say it don't mean it's true".

Frankly, we are still seeing education software in which the facts and/or processes being taught are at least shaky if not completely wrong.

Some of this is easy to spot: The programs that accept the wrong answer as right, contain incorrect formula or out of date information – especially true of geography programs. But some contain more subtle faults and conceptual blunders that are harder to spot and make the software worse than useless.

Before you can discover these problems you will probably have to buy the software and, as they won't take it back because you don't like it, let's start with a few basic precautions.

First, you need to find out whether it is going to be any use to your child. For instance multiplication tables testing for 10-year-olds is probably a waste of time in most cases as they'll quickly become bored, no matter how it is packaged.

Most seven year olds will find the greater part of division tables a complete mystery. Your child's teacher may well be able to help you as to areas for reinforcement.

Second, be very clear as to whether the software you are buying is trying to teach or reinforce. So, if you have a child taking O'level Biology a program entitled Biology Quiz may seem ideal, but is it likely to contain the right sort of questions at the right level?

Finally, remember that children are very quick to see through the most imaginative packaging of any subject. A child who finds maths difficult or boring will also find maths disguised as space-invaders difficult or boring.

Having run through this check list and bought your software there are now a series of other questions to be asked. First, try it out yourself.

Is the program self explanatory? If the child needs help will the program give it? Are the instructions within the childs reading capability? What exactly is it trying to teach or reinforce? How can you

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◀ *From Page 75*

test to see if it is working?

There can be little doubt, with most educational software, that you will need to guide your child through it at least once.

Once it is in use the main and most subtle danger is that the child will be learning the program instead of the content. This will often happen with multiple choice questions where a child can score a high mark through sheer luck and pay absolutely no attention to the actual questions.

In this kind of program the worst case can be that the child simply learns a series of response letters in the correct order to get to the end, learning absolutely nothing about the content. You can easily test this yourself by asking your child questions out of context of the machine, you may be surprised.

The theory that children can learn from computers is still under investigation but it has often been noticed that children have difficulty in transferring knowledge and skills from the best educational software to other situations.

Another point to look for is the visual reward part of the program. A child is naturally going to try to coax on to the screen the most interesting graphics and this is the carrot to computer aided learning.

Unfortunately, many of these programs produce the most interesting graphics when the child fails. Just watch a group of children playing computer hangman and see which ending they like best.

What we actually have here is a reward for wrong answers and to prevent this becoming a worse than useless program you will have to counteract with some sort of external reward for high correct scores.

Another series of problems arises in the teaching of mathematical processes and will need careful checking. For instance there are still some programs which ask children to enter answers to sums from left to right. This is not the way the child will normally work and can cause a great deal of confusion.

It is also worth noting that subtraction is taught in two different ways these days (decomposition and equal addition) and it is very important that you present your child with the one he or she is used to – the school should be able to guide you here.

So in our search for good educational software we need to find a program that children can understand, teaching the right processes and knowledge at the right time in the right way. Frankly, there's not going to be much of this sort of thing about when we look at it in terms of the needs of an individual child.

Certainly there are a reasonable amount of practice programs in basic arithmetic and some good spelling programs, especially those with large, changeable databases that have words grouped by spelling rules. But the area of programs that actually teach a child something new is still very dodgy and presently to be approached with caution.

The ideal situation is one where you are able to use the same software that is used in your child's school. If you ask nicely they may even let you try it before you go out and buy. ■

Rambling a touch too much

RURAL Rambles and Seaside Strolls are two pieces of software designed to give practice in map reading skills. At the heart of each program is a map covering an area of seven by five kilometres of which one quarter can be displayed at a time. The separate sections can be called up by pressing the numbers one to four.

Both packages have the same general content. The differences between them concern the map locations and, therefore, the symbols to be found. These maps conform to the standard Ordnance Survey 1:50000 format.

This is the main type of map that children learn to use at school and is probably the most generally useful map style.

The BBC Micro has a number of problems when it comes to map drawing. To get the maximum number of colours, Mode 2 is used and this leads to the roads and paths on the maps being rather chunky. With no brown colour on the computer, no 'B' roads are displayed.

Contour lines are conspicuous by their absence as well, but Soft-Teach could claim that their omission aids clarity.

The lettering style used on the maps is clear and sharp but not perfect Ordnance Survey style. The bottom of the screen, where questions are displayed appears to be displayed in Mode 1 and uses the standard character set.

When you load the program by the normal Shift+Break process you are presented with a menu of options. These allow you to decide how many questions you wish to answer and what you want them to be about. The five different choices are map symbols, grid references, compass directions, distances or a random mix.

With the map symbols option, you are given an instruction such as:

```
Go to Sutton Church passing an orchard
```

You then use a set of keys for the eight main compass directions to head along the roads and footpaths to reach your destination. If you can't remember the required symbols, then the 'H' key will give you the required help.

When you have completed the task Return must be pressed and the computer marks your attempt. Any errors are graphically highlighted on the map or alternatively you get an All Correct message.

The other sections operate in a similar vein, but sometimes you can leave the highways and byways for open countryside.

While the symbols and compass directions are probably suited for junior

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pupils, the harder grid reference questions need quite a lot of skill and are more suited to older children.

The section on distances gets in a muddle on units. The maps on screen are essentially metric in nature, with grid lines at one kilometre intervals. Some of the distance questions are set in metric units while others are in miles. It might have been a good idea to have had separate sections for each set of units.

The random sets of questions are not entirely suitable in these programs. Children who can cope with the harder questions will find others absurdly easy, while others will get frustrated by their inability to cope with difficult problems.

The instructions that come with the programs are very brief. A small chart shows which keys you may use but there is no indication as to what is expected of users.

The only way to find out is to load up the software and give it a try. Educational software needs better documentation than this.

One pleasant touch is the keyboard overlay (a simple piece of card) which means that users do not have to remember precisely which of the 20 or so keys they must use for each function though life might have been easier if less keys were needed!

The most serious problem I encountered with these programs was that

Seaside Strolls did not load and run. This was because they forgot to put the title program on the disc.

Fortunately for me, the required program was the same as Rural Rambles. That kind of mistake is really inexcusable and it could cause much frustration to parents or teachers as well as the youngsters trying to use the program.

This software could find some use in upper junior or lower secondary schools where a hard pressed teacher could occupy a child at the computer for a few minutes.

For home use, I would suggest parents buy their local Ordnance Survey map (about one third the price of these programs) and take their children out for some real rural rambles or seaside strolls. This is one of those cases where the computer simulation is much inferior to reality both for mental and physical exercise.

Roger Frost

Programs compatible with B (OS1.2), B+ and Master with 5.25in 40 or 80 track drives.

Program: Seaside Strolls
Price: £10.95
Program: Rural Rambles
Price: £10.95
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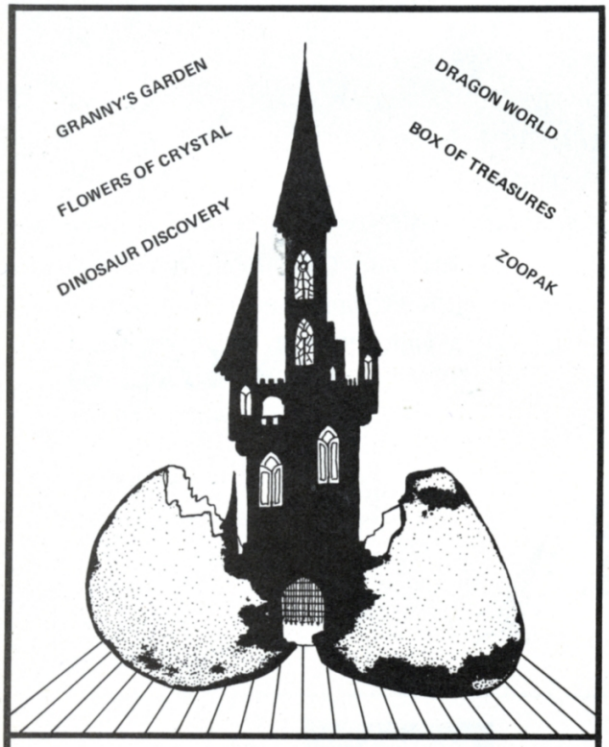

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Dave's been down-under!

Unfortunately, they sent him back. His father did all he could, but to no avail. Apparently David was beating the Aussies at "Hopper" (as well as cricket) and they didn't like it. Anyway, he's back, so if you come to see our full range of BBC software and hardware, disc drives, printers, monitors, cables etc, and you hear an Australian accent, it will only be David showing off. Actually, he sounds better than he used to!

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EDUCATION LETTERS

Keep your letters coming in – the education pages are here to reflect your interests. We want to hear your tips, ideas, experiences and suggestions. Send your contributions to:
Peter Davidson, Education Editor, The Micro User, Europa House, 68 Chester Road, Hazel Grove, Stockport, SK7 5NY.

Straying BAS 128

WE use an Econet system to run teaching and self-assessment software for undergraduate courses. So far, our software has been written in Basic and makes extensive use of text strings.

The software works perfectly in Basic IV, but if we try to run it in BAS128 to increase the number of strings the machine can hold, it crashes.

Inspection of the memory map reveals that the program becomes overwritten by its own strings.

We think that this is because BAS128 fails to switch correctly between pages of sideways ram when a string would cross a page boundary and it is only when strings are changed that it loses its way.

The problem occurs on the network ETs and on free-standing Masters, and with copies of BAS128 from different Welcome discs. We think this means there is a bug in BAS128.

Do any of your readers have a fix for it? – **Dr. Stuart Butler, Medical School, University of Birmingham.**

Switching discs

AT home I have an Acorn Electron fitted with a Rombox and Cumana disc interface connected to a Cumana disc drive and it works fine. But my discs do not work at school.

There we have a BBC Micro with a Cumana disc drive. Is there a program or a chip that will let me use my discs on the school's BBC Micro? I keep getting disc fault on both micros when I interchange discs.

If one day I can afford to get a bigger computer and change my Electron for a BBC Master, will that have the same disc problem? – **A.McPherson, Basildon, Essex.**

● There are two possible causes of the disc fault. Firstly, the Cumana interface on your Electron uses a completely different format disc to the BBC Micro.

You must use the utility disc supplied with the interface to format an Acorn DFS disc and copy your programs onto it. Both the BBC Micro and Electron will then be able to read the files.

In addition to this you must use either 40 track drives on both micros or 80 track. You can't use 40 on one and 80 on the other.

Providing you get your discs working on the school's BBC Micro you should have no problem using them on a Master.

Running commentary

I AM wondering whether there is something wrong with me or with my copy of French on the Run *from Database Software.*

Everything works perfectly but I do not seem able to get beyond Route 1 – despite answering all the questions correctly.

No matter what route I decide to take towards the Spanish border I am always timed out, so have never managed to get the password to Route 2. – **A. Crawford, Reading.**

● We contacted one of the authors of *French on the Run* about this and he made these comments:

There is nothing wrong with your copy of the program – you are just sticking too closely to what your conscience is obviously dictating.

At one point on the Spanish route you reach a "node" in the tree structure of the program, with two branches corresponding in the story line to being caught, and subsequently being offered a choice of keeping secret information to yourself or spilling the beans.

If you do the decent thing at this point, you go apparently unpenalised. But this is the one point in the route where making the true British decision does not benefit you.

A decision to keep the information to yourself sends you out into the deep shrubbery, which loses you time. It is not impossible to recover, but you have to be very lucky.

If on the other hand you spill the beans, you incur a money penalty but stay more or less on the straight and narrow.

When you reach the other routes, if you find similar problems of time or money, try thinking of yourself occasionally rather than of others.

Publishing programs

THERE is a 15-year-old boy who is exceptionally good at Basic and also some machine code programming in my class.

He has written programs that have been very useful to the school such as the computing of sports results.

Could you please advise me of any software house which would be interested in his work, or indeed if you would like to publish it. – **D.A. Thomas, head of computers department, Emlyn comprehensive school, Emlyn.**

● We are always willing to look at programs with a view to publishing them in *The Micro User*. If they are good but too long for us to publish then we will advise you on what to do with them.

Listing errors

I WOULD like to point out slight errors in the Cansim and Farm listing in the June 1987 issue of The Micro User. *Lines 130(CANSIM) and 40(FARM) should read:*

```
*KEY 10 OLD:MRUN:M
```

*These only create an error trapping routine for when Break is pressed and re-run the program so nothing is lost. Unfortunately they only work on a tape system as Page is moved down on disc systems. Other useful *FX commands that you can include are as follows:*

**FX4,1 – Disables cursor editing.*

**FX14,6 – Disables Escape.*

The program Farm is very useful for demonstrating a real life farm scene. I have made a few slight alterations to allow the program to cater for different people's abilities:

To change your starting amount of money change line 70 to:

```
70 c(0)=n:S%=0:st=0:Z=185
```

In this line n *is the amount of money. To alter the chance factor you change line 1930 to:*

```
1930 ch=n
```

The values that you insert for n *are:*

Late frost	4
Major mechanical breakdown	27
Hail	7
Wind change	32
Wet harvest	15
No problems	36

You can also change the world wheat market status by just entering line 2035:

```
2035 P$="n"
```

The possiblities for n *are LOW,FAIR or HIGH*

To change the actual price insert your own price in place of n *in the following:*

```
2060IFP$="HIGH"PRICE=n
2070IFP$="FAIR"PRICE=n
2080IFP$="LOW"PRICE=n
```

– P.M. Smith, Dunton Basset, Leicestershire.

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An exciting two-player game from Daniel Tang

UNABLE to decide who should use the micro on Friday nights, you decide to settle the matter once and for all. You venture into the intergalactic battle arena, climb into your FX class fighter and the battle begins . . . The fight is to the death, no mercy shown, the objective: Survival.

Armed only with photon torpedos you must annihilate your opponent. With true determination you may survive, without it you will be defeated and die.

You must control your fighter carefully, too much thrust and you will be thrown through the roof. Too little and you will plunge to the ground.

To see fair play, two judges fly up and down in HL-10s and get in your way. The first player to wipe out the other 10 times wins the match and can use the micro on Friday nights.

Space Arena is a two-player game, written largely in machine code. To get the game running type in Listing I and save it as Com.Src. Use the checksums to correct your typing errors. Then type:

```
MODE 7
PAGE=&3000
CHAIN"Com.Src"
```

The machine code is automatically saved as the file Combat.

Now type in Listing II and save it as Arena, again using the checksums to correct any typing errors. To play the game just run Arena.

If you want to alter the gravity or thruster power change the values of *g* and *power* in line 200 of Com.Src to the values that you want.

```
  110 REM *    Space Arena    *
  120 REM *  by Daniel Tang  *
  130 REM *  (c) Micro User  *
  140 REM *      Part 1      *
  150 REM ********************
  160 IF PAGE<&3000 PRINT"Set PAGE to &3
000 and try again.":END
  170 MODE7:PRINT"Please wait.....";
  180 FORA%=&2A00TO&2B40:?A%=0:NEXT
  190 FORA%=&2A40TO&2AFF:READ?A%:NEXT
  200 power=80:g=10:xc=&70:yc=&71
  210 x1=&72:y1=&73:x2=&74:y2=&75
  220 vel=&76:vel2=&78
  230 xf1=&7A:yf1=&7B:xf2=&7C:yf2=&7D
  240 flag=&7E:result=&7F:num=&81
  250 temp1=&82:temp2=&83:temp3=&84
  260 temp4=&85:craft=&88:craftdir=&89
  270 pitch=&C94:osbyte=&FFF4
  280 FOR L%=0 TO 2 STEP 2
  290 P%=&2B40:[OPT L%
  300 \ Converts X,Y to abs mem posn
  310 .convert
  320  TYA:PHA:LDA yc
  330  CLC:ROR A        \ Y=INT(Y/8)*2
  340  CLC:ROR A:AND #&FE:TAY
  350  LDA table640,Y   \ M=&3000+(Y*640)
  360  STA result:INY
  370  LDA table640,Y
  380  STA result+1
  390  LDA #0:STA temp1:LDA xc
  400  CLC:ROL A:ROL temp1
  410  CLC:ROL A:ROL temp1
  420  CLC:ROL A:ROL temp1
  430  CLC:ADC result
  440  STA result:LDA result+1
  450  ADC temp1:STA result+1
  460  LDA yc:AND #7:CLC
  470  ADC result:STA result
  480  PLA:TAY:RTS
  490 .table640   \ 640 times table \
  500  OPT FNtable640
  510 .mem  \ Find mem posns for sprite
  520 LDX #96
  530 .loop3 JSR convert
  540  LDA result:STA &C00,X
  550  LDA result+1:STA &C01,X
  560  DEC yc:DEX:DEX:TXA
  570  AND #15:BNE loop3:DEC xc
  580  LDA yc:CLC:ADC #8:STA yc
  590  INX:DEX:BNE loop3:RTS
  600 .down   \ Downloads sprite posns
  610  LDY #97
  620 .loop4 LDA &C00,Y
  630  STA (&86),Y:DEY:BNE loop4:RTS
  640 .p_craft  \ craft in middle
  650  LDA yc:AND #&F8:STA yc
  660  JSR convert:LDA #0:STA temp1
  670  LDA #&2A:STA temp2:LDX #5
  680 .line LDY #63
  690 .pixel LDA (temp1),Y
  700  STA (result),Y:DEY:BPL pixel
  710  LDA result:CLC:ADC #&80
  720  STA result:LDA result+1
  730  ADC #2:STA result+1:LDA temp1
  740  CLC:ADC #64:STA temp1:LDA temp2
  750  ADC #0:STA temp2:DEX:BNE line:RTS
  760 .movecraft LDA #40:STA xc
  770  LDA craft:CLC:ADC craftdir
  780  STA craft:STA yc:JSR p_craft
  790  LDA #231:SEC:SBC craft
  800  STA yc:LDA #30:STA xc
  810  JSR p_craft:LDA craft
  820  CMP #207:BEQ changeup
  830  CMP #24:BEQ changedown:RTS
  840 .changeup LDA #255
  850  STA craftdir:RTS
  860 .changedown LDA #1
  870  STA craftdir:RTS
  880 .flag2 LDA flag:STA temp3
  890  ASL A:ASL A:ASL A:ASL A
```

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Listing I

◀ *From Page 81*

```
 900  STA flag:RTS
 910 .flag1
 920  LDA temp3:AND #&F0:STA temp3
 930  LDA flag:CLC:ROR A:ROR A:ROR A
 940  ROR A:ORA temp3:STA flag:RTS
 950 .prinspri LDY #48:LDX #96
 960 .loop1 LDA &C00,X:STA temp1
 970  LDA &C01,X:STA temp2
 980  LDA gtable,Y:STA temp4
 990  LDA flag:AND #32:BEQ skip
1000  LDA gtable+48,Y:STA temp4
1010 .skip TYA:PHA:LDY #0
1020  LDA temp4:EOR (temp1),Y
1030  CMP temp4:BNE crash
1040 .cont STA (temp1),Y:PLA:TAY
1050  DEX:DEX:DEY:BNE loop1
1060 .end RTS
1070 .crash LDA flag
1080  ORA #16:STA flag:JMP cont
1090 .delspri
1100  LDY #96:LDX #0:STX temp4
1110 .loop2 LDA (&86),Y:STA temp1
1120  INY:LDA (&86),Y:STA temp2
1130  LDA (temp1,X):CLC:ADC temp4
1140  STA temp4:LDA #0:STA (temp1,X)
1150  DEY:DEY:DEY:BNE loop2
1160  LDA temp4:BEQ end3
1170  CMP #96:BEQ end3:CMP #18:BEQ end3
1180  LDA flag:ORA #16:STA flag
1190 .end3 RTS
1200 .inkey LDA #&81:LDY #&FF
1210  LDX num:JSR osbyte:TYA:RTS
1220 .fire LDA flag:BPL end2:LDX #&90
1230  LDY #&C:LDA #7:JSR &FFF1
1240  DEC pitch:DEC pitch:DEC pitch
1250  JSR convert:LDA #0:LDY #0
1260  STA (result),Y:LDA xc
1270  CLC:ADC #3:STA xc
1280  LDA flag:AND #64:BEQ right
1290  LDA xc:SEC:SBC #6:STA xc
1300 .right JSR convert:LDY #8
1310  LDA (result),Y:BNE off
1320  LDA #&FF:LDY #0:EOR (result),Y
1330  CMP #&FF:BNE off:STA (result),Y
1340  JMP end2
1350 .off LDA flag:AND #127:STA flag
1360 .end2 RTS
1370 .main LDA #&B:STA &87
1380  LDA #32:STA flag
1390  LDA #0:STA vel:STA vel+1
1400  STA vel2:STA vel2+1
1410  LDA #100:STA y1:STA y2
1420  LDA #20:STA x1:LDA #60:STA x2
1430  LDA #80:STA craft
1440  LDA #1:STA craftdir
1450 .mloop LDA vel:CLC:ADC #g:STA vel
1460  LDA #0:ADC vel+1:STA vel+1
1470  LDA #&BE:STA num:JSR inkey
1480  BEQ nothrustup
1490  LDX #&70:LDY #&C:LDA #7
1500  JSR &FFF1:LDA vel
1510  SEC:SBC #power:STA vel
1520  LDA vel+1:SBC #0:STA vel+1
1530 .nothrustup LDA #&9E:STA num
1540  JSR inkey:BEQ nothrustdn
1550  LDX #&70:LDY #&C:LDA #7:JSR &FFF1
1560  LDA vel:CLC:ADC #power:STA vel
1570  LDA vel+1:ADC #0:STA vel+1
1580 .nothrustdn LDA #&BD:STA num
1590  JSR inkey:BEQ nofire:LDA flag
1600  BMI nofire:ORA #192:STA flag
1610  LDA #210:STA pitch
1620  LDA x1:SEC:SBC #5:STA xf1
1630  LDA y1:SEC:SBC #1:STA yf1
1640  LDA flag:AND #32:BEQ nofire
1650  LDA x1:STA xf1
1660  LDA flag:AND #191:STA flag
1670 .nofire
1680  LDA vel+1:CLC:ADC y1:STA y1
1690  LDA vel2:CLC:ADC #g:STA vel2
1700  LDA #0:ADC vel2+1:STA vel2+1
1710  LDA #&A8:STA num:JSR inkey
1720  BEQ notu2:LDX #&80:LDY #&C
1730  LDA #7:JSR &FFF1:LDA vel2
1740  SEC:SBC #power:STA vel2
1750  LDA vel2+1:SBC #0:STA vel2+1
1760 .notu2 LDA #&98:STA num
1770  JSR inkey:BEQ notd2:LDX #&80
1780  LDY #&C:LDA #7:JSR &FFF1
1790  LDA vel2:CLC:ADC #power:STA vel2
1800  LDA vel2+1:ADC #0:STA vel2+1
1810 .notd2 JSR flag2:LDA #&99:STA num
1820  JSR inkey:BEQ nof2:LDA flag
1830  BMI nof2:ORA #192:STA flag
1840  LDA #210:STA pitch
1850  LDA x2:SEC:SBC #5:STA xf2
1860  LDA y2:SEC:SBC #1:STA yf2
1870  LDA flag:AND #32:BEQ nof
1880  LDA x2:STA xf2
1890  LDA flag:AND #191:STA flag
1900 .nof LDA xf2:STA xc
```

This is one of hundreds of programs available FREE for downloading on

MicroLink

In addition to these many BBC Micro programs in the MicroLink library will also run on the Electron.

```
1910  LDA yf2:STA yc:JSR fire
1920  LDA xc:STA xf2:LDA yc:STA yf2
1930 .nof2 LDA vel2+1:CLC:ADC y2
1940  STA y2:JSR movecraft
1950  LDA y2:STA yc:LDA x2:STA xc
1960  JSR mem:LDA #0:STA &86:LDA #19
1970  JSR osbyte:JSR delspri
1980  LDA xf1:STA xc:LDA yf1
1990  STA yc:JSR flag1:JSR fire
2000  JSR flag2:LDA xc:STA xf1
2010  LDA yc:STA yf1:JSR prinspri
2020  JSR down:JSR flag1:LDA y1
2030  STA yc:LDA x1:STA xc
2040  JSR mem:LDA #&70:STA &86
2050  LDA #19:JSR osbyte:JSR delspri
2060  LDA xf2:STA xc:LDA yf2
2070  STA yc:JSR flag2:JSR fire
2080  JSR flag1:LDA xc:STA xf2
2090  LDA yc:STA yf2:JSR prinspri
2100  JSR down:LDA flag:AND #17
2110  CMP #17:BEQ xpl3
2120  LDA flag:AND #1:BNE xpl2
2130  LDA flag:AND #16:BNE xpl1
2140  JMP mloop
2150 .xpl1 LDA #1:STA &8F
2160  LDA #&70:STA &86:JSR delspri:RTS
2170 .xpl2 LDA #2:STA &8F
2180  LDA #0:STA &86:JSR delspri:RTS
2190 .xpl3 LDA #3:STA &8F:RTS
2200 .gtable OPT FNb(0):OPT FNd(0)
2210  OPT FNd(&10000F01):OPT FNd(0)
2220  OPT FNd(&F0000F0F)
2230  OPT FNd(&22110000)
2240  OPT FNd(&F0000F0F)
2250  OPT FNd(&10008800)
2260  OPT FNd(&F0200F0F)
2270  OPT FNd(&F0F00000)
2280  OPT FNd(&F0000F0F)
2290  OPT FNd(&C0800000)
2300  OPT FNd(&C0200F0E)
2310  OPT FNd(&30100000)
2320  OPT FNd(&30400F07)
2330  OPT FNd(&F0F00000)
2340  OPT FNd(&F0000F0F)
2350  OPT FNd(&80001100)
2360  OPT FNd(&F0400F0F)
2370  OPT FNd(&44880000)
2380  OPT FNd(&F0000F0F):OPT FNd(0)
2390  OPT FNd(&F0000F0F):OPT FNd(0)
2400  OPT FNd(&80000F08):]:NEXT
2410 PRINT""Press space to save"
2420 REPEAT UNTIL GET=32:a$=" 2A00"
2430 z$=" "+STR$~P%:x$=" "+STR$~main
2440 $&700="SAVE Combat"+a$+z$+x$+a$
2450 X%=0:Y%=7:CALL&FFF7
2460 PRINT""Chain Arena?";
2470 IF CHR$(GETAND&5F)<>"Y" THEN END
2480 PAGE=&1900:CHAIN"Arena"
2490 DEF FNd(D%):!P%=D%:P%=P%+4:=L%
2500 DEF FNb(B%):?P%=B%:P%=P%+1:=L%
2510 DEF FNtable640:FOR I%=0 TO 31
2520 P%?0=(&3000+I%*640)MOD256
2530 P%?1=(&3000+I%*640)DIV256
2540 P%=P%+2:NEXT:=L%
2550 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
2560 DATA 0,0,0,0,17,17,34,34,34,15
2570 DATA 51,220,0,0,0,0,0,8,136,102
2580 DATA 145,81,160,64,128,3,0,0,0,0
2590 DATA 136,136,136,14,0,0,0,0,0,0
2600 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,1,3
2610 DATA 3,0,0,0,3,15,15,15,8,17,51
2620 DATA 102,15,11,5,15,15,136,0,0
2630 DATA 15,15,15,29
2640 DATA 25,17,17,17,15,15,15,7,3,0
2650 DATA 0,0,15,11,5,15,14,51,17,0,8
2660 DATA 14,15,15,3,0,136,204,0,0,0,8
2670 DATA 8,0,0,0,0,17,16,16,48,112
2680 DATA 240,240,204,136,128,128,64
2690 DATA 160,208,208,0,0,0,0,0,0,16
2700 DATA 16,17,17,48,48,112,240,240
2710 DATA 240,0,0,128,128,64,160,208
2720 DATA 208,0,0,0,0
2730 DATA 0,0,16,16,102,51,48,48,96
2740 DATA 240,240,240,0,0,0,0,128,64
2750 DATA 160,160
```

This listing is included in this month's tape & disc offer. See order form on Page 141.

100 = 0 0	260 = ADCE 2	420 = EBE1 E
110 = 0 0	270 = 15F5 0	430 = 37F6 6
120 = 0 0	280 = AAB9 A	440 = E60A 2
130 = 0 0	290 = 156F A	450 = 7787 C
140 = 0 0	300 = 0 A	460 = 22FC 7
150 = 0 0	310 = 87D1 E	470 = ED0F E
160 = BFDE E	320 = 33E2 E	480 = 8278 7
170 = A63B B	330 = 2364 5	490 = 776F A
180 = C83E D	340 = D34F 5	500 = 13B4 7
190 = 217C 5	350 = 3492 1	510 = 9324 C
200 = 68CB 9	360 = B42A D	520 = F569 A
210 = FB58 2	370 = E206 B	530 = F756 C
220 = E14E 1	380 = BB7F 1	540 = 6410 6
230 = 661F 4	390 = F4CE 5	550 = 7FEF 7
240 = 4776 D	400 = EBE1 4	560 = A91E 1
250 = 263A A	410 = EBE1 E	570 = 79B 6

```
580 = F3D6 3
590 = F39D 3
600 = 2826 7
610 = 4F19 1
620 = 775A F
630 = B4E0 C
640 = F74A 9
650 = CCED E
660 = DD7A D
670 = 8692 9
680 =  16C 0
690 = FDBD 6
700 = A49E 6
710 =  69A F
720 = E60A E
730 = 48E2 B
740 = 819D F
750 = 2C8D 6
760 = 7260 B
770 = B7C5 1
780 = FE50 8
790 = AE2A 0
800 = 8D03 C
810 = 6021 E
820 = 980E D
830 = 8E74 9
840 = E8C8 5
850 = B10A C
860 = 3274 F
870 = B10A F
880 = 3396 7
890 = 8C08 0
900 = 4130 0
910 = 6F86 D
920 =  2E8 B
930 = BB25 7
940 = A24D E
950 = E3BF F
960 = 38A7 F
970 = F3B1 0
980 = 19FA 6
990 = 5164 8
1000 = CB09 4
1010 = 4BC9 8
1020 = 4BF2 3
1030 = C084 A
1040 = 2344 D
1050 = E7AE 2
1060 = CFA8 1
1070 =  12C F
1080 = 64BA 4
1090 = 8B5E D
1100 = 36A1 2
1110 = 2E8E 9
1120 = 139B 9
1130 = 8F97 D
1140 = A79B D
1150 = A72E F
1160 = 8046 C
1170 = C18A 7
1180 = 46D7 E
1190 = 8497 D
1200 = B8FC C
1210 = 47CD 8
1220 =   92 B
1230 = FE42 8
1240 = 6C80 1
1250 = FE71 5
1260 = 9E70 A
1270 = DEAC F
1280 = 3970 B
1290 = 5BA9 8
1300 = 4284 F
1310 = 669C 6
1320 = 9D37 3
1330 = 6EAB E
1340 = 9C68 B
1350 = 19C9 A
1360 = 2EC6 3
1370 = 6D55 9
1380 = EE24 C
1390 = CFC0 2
1400 = 3BB8 0
1410 = 946D C
1420 = 248A E
1430 = 11EC F
1440 = 82D2 C
1450 = BFD6 F
1460 = B566 9
1470 = 58C1 2
1480 = AD6F 6
1490 = 61B7 C
1500 = 794E 3
1510 = DAAF D
1520 = BF8B B
1530 = F531 C
1540 = 6EB1 D
1550 = 491E 5
1560 = B612 D
1570 =  A83 C
1580 = D721 1
1590 = BDD1 9
1600 = E151 2
1610 = F0FE 4
1620 =  B05 7
1630 = 752C 7
1640 = 9749 8
1650 = 7508 5
1660 = 501F A
1670 = D669 6
1680 = 133A 0
1690 = 2F9A A
1700 = F994 2
1710 = 91B9 B
1720 = 11C8 6
1730 = EA19 E
1740 = D326 6
1750 = 9AD0 8
1760 =   65 A
1770 = 6ABE A
1780 = FE42 3
1790 = A6C2 9
1800 = 65AE C
1810 = F1CF 4
1820 = B8DF 1
1830 = 723F 5
1840 = F0FE E
1850 = 65B3 6
1860 = 1B9A 0
1870 = A614 0
1880 = 682F B
1890 = 501F 5
1900 = EE62 7
1910 = 98EF 8
1920 = 9E9B 9
1930 = 6281 8
1940 = 9243 E
1950 = B38F 5
1960 = 4A16 6
1970 = D8C9 9
1980 = 83F3 D
1990 = 1818 0
2000 = 739C 0
2010 = CF56 2
2020 = B3D1 1
2030 = 2D1E A
2040 = 1BC3 2
2050 = 6CE2 D
2060 = 5BDD 7
2070 = A9D7 C
2080 = ABB2 C
2090 = 42F5 1
2100 = 49AE 2
2110 = CDF9 D
2120 = FDB3 D
2130 =  175 F
2140 = 33F5 4
2150 = F518 9
2160 = 2258 1
2170 = 3011 A
2180 =  90E 0
2190 = F46B F
2200 = EAEC 7
2210 = 1EC5 5
2220 = 8692 F
2230 =  4D2 E
2240 = 8692 8
2250 = DC1F 1
2260 = E671 F
2270 = 64C5 3
2280 = 8692 3
2290 = A5E0 5
2300 = C4EE 5
2310 = 25F7 3
2320 = A02B 2
2330 = 64C5 1
2340 = 8692 0
2350 = 45C8 7
2360 = 4754 0
2370 = BDBF 8
2380 = 39B2 6
2390 = 39B2 2
2400 = 52FA 8
2410 = 31E9 4
2420 = 6493 A
2430 = 4FDB A
2440 = C1BC 5
2450 = A5D2 B
2460 = CEC5 8
2470 = 3B57 5
2480 = 5621 A
2490 = 7E0B 9
2500 = 9BB4 D
2510 = DC69 3
2520 = F6B1 E
2530 = 2E6A F
2540 = 169F 8
2550 = BE9B F
2560 = 4198 F
2570 = AAE4 6
2580 = 5708 7
2590 = 136D A
2600 = B9C8 B
2610 = B194 A
2620 = 5077 4
2630 = DD6D 8
2640 = 37A8 E
2650 = 9306 7
2660 = C826 0
2670 = 8350 1
2680 = 6E76 F
2690 =  E22 0
2700 = C806 7
2710 = D66F D
2720 = 7F57 7
2730 = 3A01 0
2740 = 5B83 C
2750 = 210B 8
```

Listing II

```
  100 REM **********************
  110 REM *       ARENA          *
  120 REM *   by Daniel Tang     *
  130 REM * (c) The Micro User *
  140 REM **********************
  150 ON ERROR MODE7:REPORT:PRINT" at li
ne ";ERL:END
  160 PROCos("LOAD Combat")
  170 REPEAT MODE7:PROCinst:MODE1
  180 HIMEM=&2A00:PROCsetup
  190 REPEAT PROCchars:PROCscreen
  200 CALL call:IF C%=0 C%=1:GOTO200
  210 IF ?&8F=3 PROCdraw:UNTILFALSE
  220 PROCexplode:UNTIL n1%>9 OR n2%>9
  230 PROCend(n1%>9):UNTIL FALSE
  240 DEFPROCsetup:C%=0
  250 call=&2D46:x1=&72:y1=&73
  260 x2=&74:y2=&75:n1%=0:n2%=0
  270 VDU23;8202;0;0;0;
  280 ?&C70=&10:?&C72=&F6
  290 ?&C73=&FF:?&C74=5:?&C76=2
  300 ?&C80=&10:?&C82=&F6
  310 ?&C83=&FF:?&C84=5:?&C86=2
  320 ?&C90=&11:?&C92=&F6
  330 ?&C93=&FF:?&C96=1:ENDPROC
  340 DEFPROCchars
  350 FORA%=&B00TO&C00:?A%=0:NEXT
  360 VDU23,128,&1F07;&7F3F;&FF7F;&FFFF;
  370 VDU23,129,&F8E0;&FEFC;&FFFE;&FFFF;
  380 VDU23,130,&FFFF;&7FFF;&3F7F;&071F;
  390 VDU23,131,&FFFF;&FEFF;&FCFE;&E0F8;
  400 VDU23,159,&FFFF;&FFFF;&FFFF;&FFFF;
  410 c$=CHR$159:ENDPROC
  420 DEF PROCscreen:CLS:VDU19,7,0;0;
  430 COLOUR 1:PRINTSPC2"Player 1"SPC7"G
ames"SPC7"Player 2"
  440 COLOUR 2:PRINTSPC6;n1%SPC26;n2%
  450 COLOUR 7:d$=c$+c$
  460 PRINTCHR$128STRING$(37,c$)CHR$129
  470 FORA%=2TO28:PRINTd$SPC35d$:NEXT
  480 PRINTCHR$130STRING$(37,c$)CHR$131
  490 VDU19,7,7;0;:ENDPROC
  500 DEF PROCexplode:GCOL 3,7
  510 IF ?&8F=1 X%=?x1*16:Y%=1024-(?y1*4
):n2%=n2%+1 ELSE X%=?x2*16:Y%=1024-(?y2*
4):n1%=n1%+1
  520 v=-15:i=0.125:s=30:d=0
  530 FOR A%=220TO90STEP-5:v=v+i:d=d+s
  540 PROCdots:X%=X%+4:PROCdots:X%=X%-4
  550 SOUND 1,0,A%,0:SOUND &10,v,7,3
  560 PROCdots:X%=X%+4:PROCdots:X%=X%-4
  570 s=s-1:NEXT:ENDPROC
  580 DEF PROCdots
  590 PLOT69,X%,Y%+d:PLOT69,X%,Y%+d+4
  600 PLOT69,X%+d,Y%:PLOT69,X%+d,Y%+4
  610 PLOT69,X%,Y%-d:PLOT69,X%,Y%-d+4
  620 PLOT69,X%-d,Y%:PLOT69,X%-d,Y%+4
  630 ENDPROC
  640 DEF PROCdraw
  650 FOR A%=1 TO 3:COLOUR 2
  660 PRINTTAB(17,1)"Draw!"
  670 SOUND 1,-15,210,2:PROCw(.45)
  680 PRINTTAB(17,1)SPC5:PROCw(.5)
  690 NEXT:ENDPROC
  700 DEF PROCw(t):t=t*100+TIME
  710 REPEAT UNTIL TIME>t:ENDPROC
  720 DEF PROCinst:FOR Y%=0 TO 1
  730 VDU31,0,Y%,141,129,157,135
  740 PRINTSPC14"Arena":NEXT
  750 PRINTSPC13"by Daniel Tang"
  760 PRINT"SPC4"Player 1 controls"
  770 PRINT'SPC9"A - Thrust down"
  780 PRINTSPC9"Z - Thrust up"
  790 PRINTSPC9"X - Fire"
  800 PRINT"SPC4"Player 2 controls"
  810 PRINT'SPC9"+ - Thrust down"
  820 PRINTSPC9"> - Thrust up"
  830 PRINTSPC9"< - Fire"
  840 VDU31,0,23,129,157,135
  850 PRINTSPC6"Do you want sound?";
  860 REPEAT A%=INSTR("YyNn",GET$)
  870 UNTIL A%>0:VDU23;8202;0;0;0;
  880 PROCos("FX210,"+STR$(A%DIV2))
  890 PRINTTAB(9,23)"Press space to go";
  900 REPEAT UNTIL GET=32:ENDPROC
  910 DEF PROCos($&700):LOCAL X%,Y%
  920 Y%=7:CALL&FFF7:ENDPROC
  930 DEF PROCend(A%):PROCw(3):*FX21
  940 a$="You win Player "+STR$(2+A%)
  950 PRINTTAB(10,15);
  960 FOR A%=1 TO LEN a$
  970 B%=ASCMID$(a$,A%):VDU B%
  980 SOUND0,15*(B%>32),2,1:PROCw(.5)
  990 NEXT:PROCw(3.5):ENDPROC
```

This listing is included in this month's tape & disc offer. See order form on Page 141.

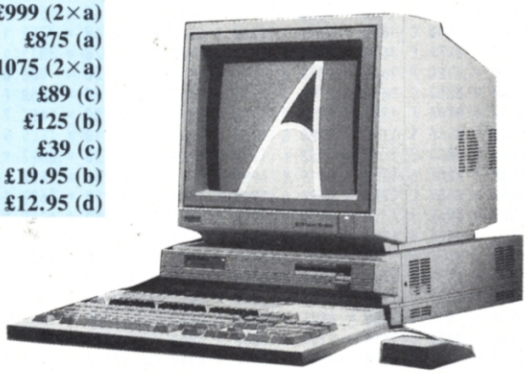
```
100 =    0 0
110 =    0 0
120 =    0 0
130 =    0 0
140 =    0 0
150 = BC2B B
160 = 4184 7
170 = FB80 F
180 = F939 B
190 = 6621 2
200 = F97A 7
210 = 2F49 2
220 = 1AB8 1
230 =  138 5
240 = B603 E
250 = 6166 5
260 = 5FCC 5
270 = F716 F
280 = 7D01 8
290 = D6E7 6
300 = C118 D
310 = 5E60 D
320 = F4D5 B
330 = B07F D
340 = 1613 F
350 = 4F80 D
360 = 55EA 8
370 = A156 D
380 = FF31 F
390 = 90AB 8
400 = 9E72 B
410 = CD7A A
420 = C98F D
430 = 2FD2 8
440 = 841C 3
450 = 3A94 6
460 = A653 E
470 =  BD9 5
480 = 4AA1 C
490 = 13BC 0
500 = B400 B
510 = 4C65 E
520 = 5492 1
530 = E90A B
540 = D5B9 0
550 =  9C9 1
560 = D5B9 4
570 = B643 C
580 = 4BA9 B
590 = 12FB A
600 = 3112 9
610 = F5D9 A
620 = 7437 7
630 = ED0F 5
640 = F699 9
650 =  C96 F
660 = 7F40 4
670 =  43D 0
680 = 3CB1 A
690 = E531 B
700 = 7559 3
710 = E9A6 D
720 = 214C C
730 = 4498 E
740 = FB79 9
750 = 4CE2 7
760 = 6F71 B
770 = 94B1 3
780 = C37F 9
790 = 9E2F 4
800 = 178B 3
810 =  F61 0
820 = 88AA E
830 = FAE5 5
840 = 2EC2 E
850 = F2BC E
860 = AEE6 9
870 = 488D 8
880 = 1A6C F
890 = 8542 A
900 = BF3A 0
910 = 61B0 F
920 = 50E0 E
930 = 6211 2
940 = 3971 B
950 = 9106 2
960 = FC54 D
970 = A765 5
980 = AB3F 8
990 = 8444 1
```

TECHNOMATIC

BBC COMPUTERS & ECONET CENTRE
17 Burnley Road, London NW10 1ED Tel: 01-208 1177
305 Edgware Road, London W2 Tel: 01-723 0233

ARCHIMEDES

Archimedes 305 Basic	£799 (a)
Archimedes 305 Colour	£999 (2×a)
Archimedes 310 Basic	£875 (a)
Archimedes 310 Colour	£1075 (2×a)
0.5Mb upgrade for 305	£89 (c)
2nd Floppy Drive	£125 (b)
Podule Backplane	£39 (c)
Archimedes Ref. Manual	£19.95 (b)
ARM Assy Lang Prog.	£12.95 (d)



(Please enquire about the availability of some of the above packages)

BBC MASTER COMPACT

See page 6 for free bundled software

SYSTEM 1
128K, Single 640K Drive & bundled software. £329 (a)

SYSTEM 2
System 1 with a 12" Hi Res Monochrome Monitor. £369 (a)

SYSTEM 3
System 1 with a 14" Med Res RGB Monitor. £509 (a)

Second Drive Kit. £99 (c)
Serial Kit. £29 (d)
T.V. Modulator £29 (d)
Extension cable for external 5.25" 80T Drive. £12.50 (d)

Mertec Adaptor (Upgrades to almost master level) NEW £35 (c)

FILE STORE

Acorn's new file server system
Filestore E01 £828 (a)
Filestore E20 £710 (a)
Full details on request
Acorn 30Mb Winchester
(incl FS III Software) £1530 (a)

ECONET ACCESSORIES

Econet Starter Kit	£85 (b)	Econet Bridge	£174 (b)
Econet Socket Set	£29 (c)	Printer Server Rom	£41 (d)
File Server Level II	£75 (b)	10 Station Lead Set	£26 (d)
Master FS Utility Disc	£17.25 (d)		

UPGRADE KITS

1.2 OS ROM	£15 (d)	ADFS ROM	£26 (d)
DNFS ROM	£19 (d)	1770 DFS Kit	£43.50 (d)
BASIC II ROM	£22.50 (d)	Econet Kit	£55 (d)

SECOND PROCESSORS

Universal 2nd Processor Adaptor £75 (b)
TORCH ZEP100 £229 (a)
MULTIFORM Z80
TECHNOMATICs multi format Z80 system includes a FREE Pocket Wordstar + MS/DOS Read/Write Utility £249 (b)

ACW/CO-PROCESSOR

For full specification see page 5
32016 Co-processor £949 (a)
Cambridge Workstation £3450 (a)
X25 Gateway £2175 (b)

ACORN IEEE INTERFACE

Allows BBC computer to control any scientific and technical equipment that conforms to the IEEE488 standard. The interface can link upto 14 compatible devices. Typical applications are in experimental work in academic and industrial labs. £265 (a)

EPROMS/RAMS

2764-25	£2.80 (d)
27128-25	£3.60 (d)
6264LP-15	£2.60 (d)
27256	£5.00 (d)
27512	£9.90 (d)

RAM/ROM EXPANSION

ATPL Board for Model B. Simple to instal, no soldering. Allows expansion to 15 Roms + 28K Rams £37 (c)
ATPL Battery backup kit £16 (d)
ATPL Board for BBC+ £31 (c)

BBC MASTER SERIES

AMB15 MASTER
(see page 6 for details of bundled software included in the price) £375 (a)
AMB12 MASTER ET £315 (a)
AMCO6 Turbo 65C02 Module £99 (b)
ADC08 512 Processor £195 (b)

ADF14 ROM Cartridge	£13(d)	ADJ23 Ref Manual	
ADF10 Econet Module	£41(c)	Part II	£14(c)
ADJ22 Ref Manual		ADJ24 Adv	
Part 1	£14(c)	Ref Manual	£19.50(c)
BBC Master		View User Guide	£10(d)
Dust Cover	£4.75(d)	Viewsheet User Guide	£10(d)

MASTER ROM/RAM CARTRIDGES

TRC1 Two rom cartridge	£8.95 (d)
TRC4 Four rom cartridge	£11.95 (d)
TRC 32K Cartridge inc RAM	£29.95 (d)

LEARN ARABIC WITH YOUR COMPUTER

مساعد تعليم العربيه

Convert your BBC or Master computer to bilingual operation with the BABEL Arabic Package.

Beautiful Arabic text. Software developed and tested in the classroom for 2 years to help the young read and understand Arabic.

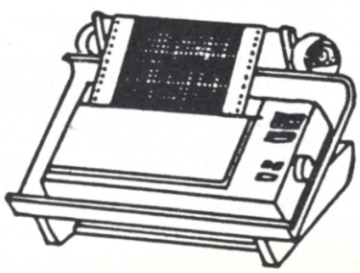
The package comprises: an easy to install EPROM, a set of keycap labels, an instruction booklet and a disc with absorbing programs: Mastering the Arabic alphabet, Arabic grammar exercisess, English to Arabic and Arabic to English translation exercises.

The BABEL Arabic Package £70 (d)
Other Arabic educational software for the converted micro; each disc £15 (d)
(Please specify 40 or 80 tracks). Send for more details.

Master Operating System
(book by David Atherton)
£12.95 (c)

PRINTER STAND

A new style printer stand with easy paper feed and paper seperation, provides complete access to paper. Can be used with both top and bottom paper feed. Very space efficient. £34 (b)



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West End Branch
305 Edgware Road, London W2
Tel:01-723 0233
(near Edgware Road ⊖)

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Prices are subject to change without notice
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(b) £2.50
(c) £1.50
(d) £1.00

PRINTERS

EPSON LX800 £209 (a)

150 cps, variety of fonts, including NLQ, bit image graphics, IBM char/graphics compatible, centronics interface and tractor feed as standard £229 (a)

EPSON FX800
An enhanced version of FX85.
Call for details. £315 (a)

EPSON FX1000
An enhanced version of FX105.
Call for details. £439 (a)

EPSON EX800 £409 (a)

EPSON EX1000 £595 (a)

Colour option for EX800/EX1000. £59 (b)

EPSON LQ800 £439 (a)

EPSON LQ1000
As LQ800 but wider carriage for 136 columns. £609 (a)

TAXAN KP815
Enhanced KP810 with 160cps and full IBM compatibility. £269 (a)

TAXAN KP915
Enhanced KP910 with 180cps and full IBM compatibility. £369 (a)

NATIONAL PANASONIC KX P1081
includes *free* Wysiwyg + Rom and Printer Lead £159 (a)

STAR NL 10 (Parallel Interface) £190 (a)

STAR NL 10 (Serial Interface) £219 (a)

INTEGREX Multicolour Inkjet printer.
Ideally suited for high res colour VDU screen dumps. Quiteness & consistent output are major characteristics. £549 (a)
BBC Screen dump for Integrex. £15 (d)

BROTHER HR20
8K buffer standard expandable to 16K. Parallel & Serial ports as standard. £349 (a)

NAT PANASONIC KX P3131
Daisy wheel printer with 38K buffer, 17 cps, bi-directional, parallel interface £249 (a)

JUKI 6100 Daisy wheel printer
15 cps, 2K buffer, switchable 10/12/15 cpi proportional spacing, underlining. Parallel interface. £310 (a)

Parallel Printer Lead (1.2m) £6 (d)

MODEMS

All modems listed below will be supplied with BBC Publications ModemMaster comms package and a BBC data lead.

MIRACLE WS4000 V21/23 £140 (b)

MIRACLE WS3000 V21/23 £265 (b)

MIRACLE WS3000 V22 £445 (b)

MIRACLE WS3000 V22 bis £585 (b)
(All modems are BABT approved)

BBC Data Cable for WS3000/4000 £7 (d)

MIRACLE WS2000V21/23 & BELL stds £92 (c)

WS2000 Auto Dial Card £27 (d)

WS2000 Auto Answer Card £27 (d)

WS2000 SK1 Kit £5 (d)

WS2000 User Port Lead £5 (d)

TIME WARP

Real Time Clock. Plugs into the user port, battery back up as standard, includes manual, demo software including a diary/planner application program £31 (d)

PLOTTERS

HITACHI 672 £495 (a)

LINEAR GRAPHICS
Full range of accessories available for plotmate plotters

A4S PLOTMATE £282 (a)

A4SM PLOTMATE £342 (a)

A3 PLOTMATE £299 (a)

A3M PLOTMATE £431 (a)

PRINTER SHARERS & BUFFERS

BUFFALO PB Buffer
Parallel buffer for internal fitting to most Epson printers. Simple to instal.
PB128 (128K) £89 (c)

PERIPHERAL & COMPUTER SHARERS
High quality switches to allow the user to switch between computers, printers, modems etc. Fully shielded metal cases. all lines fully switched.

	Parallel		Serial
2 Computers to 1 Printer 36v36-2	£25(c)	25v25-2	£25(c)
3 Computers to 1 Printer 36v36-3	£39(c)	25v25-3	£39(c)
4 Computers to 1 Printer 36v36-4	£45(c)	25v25-4	£45(c)
2 Computers 2 Printers X-over 36v36-x	£49(c)	25v25-x	£49(c)
BBC Cable set 3 to 1 (1m ea)	£24(c)		
BBC Cable set 4 to 1 (1m ea)	£30(c)		

BBC Computer Sharer: TCS26
1 computer to 2 printers fitted with BBC cable £22 (c)

Paper & Labels
Plain fanfold paper with microperforation:

2000 sheets 9½ × 11"	£12	(£3.50)
2000 sheets 14½ × 11"	£18.50	(£4.50)
1500 sheets A4 90gsm	£18.00	(£4.00)

Labels/1000

Single Row 3½ × 1 7/16"	£5 (d)
Triple Row 2 7/16" × 1 7/16"	£5 (d)

PROGRAMMING ACCESSORIES/SOFTWARE

Compatible with B, B + and Master

EpromRyter (Epromer II)
Eprom Ryter is compatible with BBC Master only £119 (b)
Upgrade of Epromer II to Eprom Ryter (Please return your Epromer II) £49 (b)

EPROMER II £89 (b)

MPROMER £49 (c)

META ASSEMBLER £145 (b)

PORTAL EPROM EMULATOR 512K £245(b)

TEAM Disassembler £145 (b)

EPROM ERASERS

UV1B 6 eproms, safety cutout £47 (b)

UV1T 6 eproms, timer, safety cutout £59 (b)

MONITORS

BBC lead incl with all monitors

MICROVITEC 14" RGB Monitors
Please specify plastic or metal case.

Microvitec 1431
Standard Resolution 453 pixels £179 (a)

Microvitec 1431AP
As 1431 + composite video and sound input £199 (a)

Microvitec 1451
Medium Resolution 653 pixels £225 (a)

Microvitec 1451AP
As 1451 + composite video and sound input £255 (a)

Microvitec 1441
High Resolution 895 pixels £359 (a)
14" Medium Res Colour monitor with RGB TTL and Linear input, sound input. Front panel for brilliance, contrast, volume and mono/colour options. Compatible with BBC and PC Compatibles £199 (a)

Microvitec 20" RGB/PAL/Audio Monitors

Microvitec 2030CS
Standard Resolution RGB/Comp Video £380 (a)

Microvitec 2040CS
High Resolution RGB/Comp Video £685 (a)

TOUCHTEC-501
Brings genuine touch screen operation on metal cased Microvitec monitors, incl utilities disc with starter and development programs £239 (b)

TAXAN SUPER VISION 620
12" Hi Res/Hi Contrast
Option to switch to green/amber
BBC/IBM Compatible £269 (a)

TAXAN SUPER VISION 625
12" Super Hi Res and contrast RGB Monitor with option to switch to mono BBC/IBM compatible. £319 (a)

12" MONOCHROME MONITORS

TAXAN KX 117
Hi Res green etched screen £85 (a)

TAXAN KX 118
Hi Res Long Persistence (P39) £90 (a)

TAXAN KX 119
Hi Res amber etched screen £90 (a)

PHILIPS BM 7502
Hi Res green screen. £69 (a)

PHILIPS BM7522
Hi Res amber screen. £75 (a)

PHILIPS BM 7542
Hi Res White screen. £79 (a)

MONITOR ACCESSORIES

Microvitec Swivel Base (14" plastic monitors)	£17 (c)
Philips Swivel Base	£10 (c)
Monitor Stand Models B & B +	£10 (c)
Monitor Stand Master	£13 (c)
Double Tier stand Models B, B + or Master	£24 (b)
Taxan RGB Lead	£5 (d)
Microvitec Lead	£3.50 (d)
Monochrome BNC/Phono Lead	£3.50 (d)

TECHNOMATIC

BBC COMPUTERS & ECONET CENTRE
17 Burnley Road, London NW10 1ED Tel: 01-208 1177
305 Edgware Road, London W2 Tel: 01-723 0233

CAD/DRAWING PACKAGES

NOVACAD
Cad Package for B, B & MASTER.
(See page 5 for specification)

Tracker Ball/Mouse Version (TM)	£79 (d)
TM Version plus Tracker Ball	£119 (c)
TM Version plus Mouse	£105 (c)
Plotter Driver Generator	£25 (d)
MOUSE	
AMX MOUSE with SUPER ART (pse specify B, B+ or Master)	£63 (d)
PAGEMAKER	£32 (d)
EXTRA/EXTRA (utility for the Pagemaker)	£19 (d)
MAX	£17 (d)
STAND ALONE MOUSE (includes horizontal scroll lock)	£34 (c)
RB2 TRACKER BALL	
RB2 Tracker Ball with Icon Master (for B, B+ & Master)	£59 (c)
RB2 Tracker Ball with Cursor Control Rom (for Master only)	£59 (c)
RB2 Tracker Ball 'Stand Alone' for use with NOVACAD & other software)	£47 (c)
Cursor Control Rom for Master	£12.50 (d)
MIRRORSOFT FLEET STREET EDITOR	£35 (d)

CP/M SOFTWARE

Send for details on our full range of CP/M & PC DOS packages for Business, Communications & High Level Languages.

Please send for details on our range of CP/M software for Acorn/Torch Z80 2nd Processors

BBC SOFT/FIRMWARE

All software supplied by us is known to operate with the appropriate Acorn Disc filing systems. We **cannot** *comment on their use with other DFS systems.*

DATABASE MANAGEMENT SYSTEMS

VIEWSTORE	£37 (d)
STARdataBASE	£39 (d)
MASTERFILE II	£17 (d)
ACORN OVERVIEW PACKAGE Special Offer (RRP £86)	£57 (b)

WORD PROCESSORS

ACORN VIEW PROFESSIONAL	£85 (c)
VIEW 2.1	£37 (d)
VIEW 3.0	£49 (c)
VIEW INDEX	£12 (d)
VIEW PRINTER DRIVER GENERATOR	£7 (d)
VIEWSPELL	£29 (d)
DOT PRINT PLUS	£28 (d)
WORDWISE	£24 (d)
WORDWISE PLUS	£38 (d)
WYSIWYG PLUS	£21 (d)
SPELLMASTER	£47 (d)
INTERWORD	£39 (d)
WORDEASE	£24 (d)
SPELLCHECK III	£31 (d)
EDWORD II	£43 (c)

SPREADSHEETS

VIEWSHEET	£37 (d)
WINDOWMATIC	£15 (d)
VIEWPLOT	£22 (d)
INTERSHEET	£37 (d)
INTERCHART	£26 (d)
ULTRACALC	£29 (d)
MINI OFFICE II DISC Version	
For B & B+ 40T or 80T	£14.50 (d)
For Master 80T	£17.30 (d)
For Compact	£19 (d)
MINI OFFICE II ROM Version	
For Master, Compact, B+ & B	£48 (c)

LANGUAGES

META ASSEMBLER	£145 (b)
TEAM DISASSEMBLER	
MACROM	£33 (d)
ACORN MICRO PROLOG	£62 (d)
ISO-PASCAL	£51 (c)
ISO-PASCAL STAND ALONE GENERATOR	£30 (d)
OXFORD PASCAL (40 or 80T) Specify B or B+	£36 (d)
OXFORD PASCAL for Master	£52 (d)
ACORN LOGO	£46 (c)
LOGOTRON LOGO	£55 (c)
BBC PUBLICATIONS OPEN LOGO	£59 (c)
ACORN LISP ROM	£43 (d)
ACORN FORTH ROM	£39 (d)
ACORN COMAL ROM	£43 (d)
MICROTEXT	£52 (c)
MICROTEXT PLUS	£229 (b)

COMMUNICATIONS

TERMULATOR	£25 (d)
COMMSTAR II	£28 (d)
COMMUNICATOR	£49 (d)
MODEM MASTER	£11 (d)
COMMAND	£34 (d)
MASTER TERMULATOR	£34.75 (d)

UTILITIES

ACCELERATOR	£49 (d)
ACORN BASIC EDITOR	£24 (d)
MONITOR (BBC Pub)	£19 (d)
BROM PLUS	£26.50 (d)
SLEUTH	£23 (d)
TOOLKIT PLUS	£31 (d)
TOOLBOX 2 (BBC Pub) Manual	£9.50 (d)
Cassette	£9 (d)
ACORN GXR GRAPHICS ROM specify B or B+	£24(d)
PRINTMASTER	£24 (d)
PRINTWISE	£24 (d)
DUMPMASTER	£26 (d)
FONTWISE PLUS	£17 (d)
HERSHEY FONT CHARACTER GENERATOR	£18 (d)
ICON MASTER	£29 (d)
MOVIE MAKER Two Roms + Cassette	£26 (d)
ADV TELETEXT UTILITIES ROM	£7.95 (d)

COMPACT (all on 3½" disc)

ARTROOM	£27 (d)
FONTWISE+	£22 (d)
FONT EDITOR	£22 (d)
RAMROD	£37 (d)
BROM PLUS	£32 (d)
MACROM	£37 (d)
BETABASE	£27 (d)
WHITE KNIGHT MKII	£16 (d)
BBC PUBLICATIONS BUNDLED SOFTWARE	£18.50 (d)

BBC PUBLICATIONS EDUCATIONAL SOFTWARE

A series of programs developed in many cases alongside Radio & TV programmes by BBC's Education Department which supplement the classroom studies by moving and colourful displays helping in clear understanding of a variety of subjects. Some packages also include audio cassettes.

PRIMARY EDUCATION

ASTRONOMY	£11 (d)
COMPUTERS AT WORK	Aud/EC/disc£16 (c)
PICTURE CRAFT	Disc£17 (d)
INTRODUCING GEOGRAPHY	Disc£16 (d)
MATHS WITH A STORY 1	Cass£8 (d)
MATHS WITH A STORY 2	Cass£8 (d)
NUMBER GAMES	Cass/EC£7.50 (d)
USING YOUR COMPUTER	Cass£24 (c)

SECONDARY LEARNING

TECHNOLOGY & DESIGN Pt1	£21.50 (c)
ELECTRIC FIELDS	£10.50 (d)
ADVANCED LEVEL STUDIES: STATISITICS	Disc£23 (d)
ADVANCED STUDIES: GEOGRAPHY	Cass£10 (d)
INSIDE INFORMATION	Prog Cass£10 (d)
	Book£8 (d) Audio Cass£5 (d)
SCIENCE TOPICS (ST)	
S.T.:WAVES	Disc£14 (d)
S.T.:RELATIONSHIPS	Disc£14 (d)
S.T.:BONDING	Disc£14 (d)
S.T.:ELECTROMAGNETIC SPECTRUM	Disc£14 (d)
S.T.:ELECTRONICS IN ACTION	Disc£14 (d)
S.T.:NEWTON & THE SHUTTLE	Disc£19 (d)
S.T.:ECOLOGY	Disc/EC£19 (d)
S.T.:POLYMERS	Disc/EC£19 (d)
S.T.:CLASSIFICATION & PERIODIC TABLE	Disc£20 (d)
S.T.:FOOD & POPULATION	Disc£20 (d)
SEC.SCIENCE MICROTECHNOLOGY	Cass£7 (d)
SEC.SCIENCE:THE MOLE CONCEPT	Disc/Aud/EC£16 (c)

GENERAL

VU-TYPE PROFESSIONAL	Disc£19 (d)
WHITE KNIGHT MK II (for compact)	Disc£16 (d)
BATTLEFIELDS	Cass£8.50 (d)
A VOUS LA FRANCE	Cass/EC£17 (d)
	Book£5.25 (d)
	Audio Cassettes (2) £7.50 (a)
Additional charges for discs	£9.00 (d)
DEUTSCH DIREKT	Disc/aud/EC£16 (c)
	Book£5.95 (d)
MODEM MASTER	£11 (d)

Cassette based programs listed above can be supplied on disc at an extra charge of £1.50 per disc and please specify the format required 40 or 80T.

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(d) £1.00

BOOKS

No VAT Carriage Code (c)

LANGUAGES

6502 Assy Lang Prog	£19.95
6502 Programming	£13.95
8086 Book	£23.95
Acorn BCPI User Guide	£15.00
Acorn FORTH	£7.50
Acorn LISP	£7.50
Acorn ISO Pascal Ref Manual	£10.00
Intro to COMAL	£10.00
Intro to LOGO	£7.50
Micro Prolog Ref Manual	£10.00
Introduction to Turbo Pascal	£14.95
Prog the Micro with Pascal	£8.50
The Supervisor's BBC Micro	£10.95

BBC MICRO GUIDE BOOKS

Inside Information	£8.95
Maths Prog in BBC Basic	£7.95
The Friendly Computer Book	£4.50
Toolbox 2	£10.95

PROGRAMMING/UTILITY

Advanced Sideways Ram User Guide	£9.95
Advanced User Guide (BBC)	£15.95
Applied Assembly Language on the BBC	£9.95
BBC Micro Advance Programming	£9.95
BBC Micro Ref Guide (B Smith)	£10.95
BBC Micro Sideways ROM's RAM's	£9.95
Guide to the BBC Rom	£9.95
Beginners Guide to W.P.	£7.95
Mastering Assembly Code	£8.95
Mastering Interpreters & Compilers	£14.95
Mastering View, Viewsheet & Viewstore	£12.95
View by B. Smith	£12.95
View 3.0 User Guide	£10.00
Viewstore User Guide	£10.00
Viewsheet User Guide	£10.00
Wordwise Plus	£9.95

SOUND & GRAPHICS

Computer Graphics & CAD Fundementals	£9.95
Mastering Music	£6.95

DISC DRIVE SYSTEMS

Advanced Disc User Guide	£16.95
Disc Book	£3.50
Disc Programming Techniques	£7.95
Disc Systems	£6.95
File Handling on the BBC	£6.95
Discovering Disc Drives	£POA
Practical Disc File Techniques	£5.95
Mastering the Disc Drive	£12.95
Mastering DOS plus	£12.95

APPLICATIONS

Interfacing Proj for BBC	£6.95
BBC and Small Business	£5.75
The Software Business	£5.50

Mastering Operating System (David Atherton) £12.95

WYSIWYG PLUS

WYSIWYG PLUS is a printer and screen utility for Wordwise Plus, View, Interword, and Basic users, supplied on a 16K Eprom. To obtain a particular printer effect, such as enlarged text, it used to be necessary to discover the appropriate 'printer control code' from your manual and incorporate it into your text. Secondly, you had to print several trial copies in order to position the effect correctly in relation to the rest of your text.

WYSIWYG PLUS simplifies this trial and error approach using easily remembered *commands. For example, *ENLARGED not only selects enlarged text on your printer, but uniquely shows you double width characters on your screen, even from within Wordwise Plus!

WYSIWYG PLUS incorporates a logo editor. Just draw your design on screen using the arrow keys, and save the results. Use the *GRAPHICS command to incorporate your design anywhere in your text; position and see your design in your text before faithfully reproducing a hard copy.

There is also special help for daisy wheel users. The *WHEEL command will prompt you to change daisy wheels whenever a change in type style is about to occur.

WYSIWYG PLUS is designed to work with the following systems:

BBC Model B
BBC Model B+
BBC Master 128
BBC Compact

6502 Second processor,
Turbo coprocessor
All printers (Except lasers)

WYSIWYG PLUS workspace is relocatable.

WINDOWMATIC

All users of Acorn's VIEWSHEET speadsheet program will be aware of its powerful windowing facility which allows the screen and/or printer to be configured in up to 10 seperate windows taken from anywhere in the sheet. They will also be painfully aware of how difficult and time consuming it is to set up a required display. Although VIEWSHEET allows configurations to be saved to the media, it does not have provision for deciphering them.

WINDOWMATIC has been produced with the intention of rectifying these shortcomings and to bring out the very best from VIEWSHEET.

WINDOWMATIC provides a quick and easy way to configure screen and printer allowing complicated documents and reports to be set up much more easily. It displays complete text information on all 20 windows and accurate graphic representation of the screen and printer output.

The package includes a screen dump routine for Epson printers and allows use of other printer dump packages.

WINDOWMATIC is compatible with BBC Master and BBC B+. A 6502 2nd processor must be fitted to a model B to run Windowmatic. Windowmatic is fully compatible with Turbo and 6502 2nd processor.

The program is supplied on disc with a comprehensive manual.

VU-TYPE

Do you have finger trouble when typing?
Do your letters look like this?

Dear Sor,
I wuold like to .....

then you need:

VU-type, a complete touch typing program produced by BBC/Pitman.

It allows you to learn at your own pace and has a wide range of exercises. Screen displays show the keys you have pressed and it will report on your speed and accuracy.

Supplied on a 40T Disc with a manual.

Available at a special price of £7.50(d)
instead of the usual £15. Offer valid while stocks last

EDUCATIONAL/FUN SOFTWARE BUNDLE

Wordmover
Wordplay
Pantry Antics
Drawstick
Locomotion

These programs are supplied from the BBC Publications Educational Software range and will be supplied on a 5.25" disc for BBC Master, B+ and B and on a 3.5" disc for the Compact.

5.25" Disc £17.50(d)
3.5" Disc £18.50(d)
(Normal RRP over £40)

PRINTER ACCESSORIES

EPSON ACCESSORIES:

Interfaces

8143 RS232 ..... **£30 (d)**
8148 + RS232 + 8k ..... **£65 (d)**
8177P NLQ for FX80 +/FX100 + .. **£99 (d)**
Parallel & Serial Buffers of various size also available.
LQ800 Tractor Feed ..... **£47 (b)**
LQ1000 Tractor Feed ..... **£52 (b)**

SHEET FEEDERS:

LQ800 ..... **£135 (b)**
LQ1000 ..... **£179 (b)**
EX800 ..... **£135 (b)**
EX1000 ..... **£309 (b)**
FX800 ..... **£135 (b)**
FX1000 ..... **£179 (b)**

Ribbons:

RX/FX100/100 +, FX105 ..... **£7 (d)**
RX/FX80/80 +, FX85 ..... **£4 (d)**
LX80/LX800 ..... **£4.50 (d)**
LQ800 ..... **£8.50 (d)**
LQ1000 ..... **£10 (d)**
EX800/1000 ..... **£7.50 (d)**
H180 Pen Set (Aqueous/Ball point) ..... **£8.25 (d)**

HITACHI 672 Plotter

Aqueous Pen Set six pens .... **£18.50 (d)**
Oil Based Pen Set six pens ... **£25.00 (d)**

TAXAN CANON Accessories:

Ribbon, KP810/815/910/915 ..... **£6 (d)**

Star Printer

NL10 Sheet Feeder ..... **£52 (b)**
NL10 Ribbon ..... **£4.50 (d)**

National Panasonic KX P1080/81

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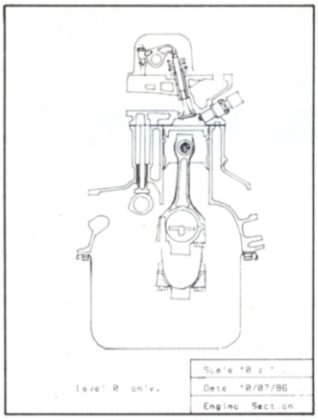

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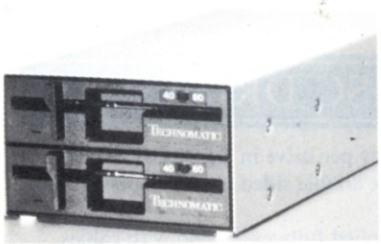

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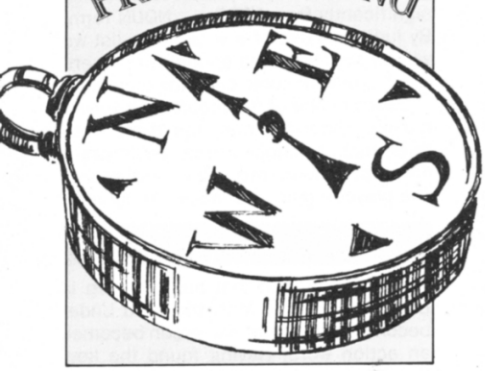

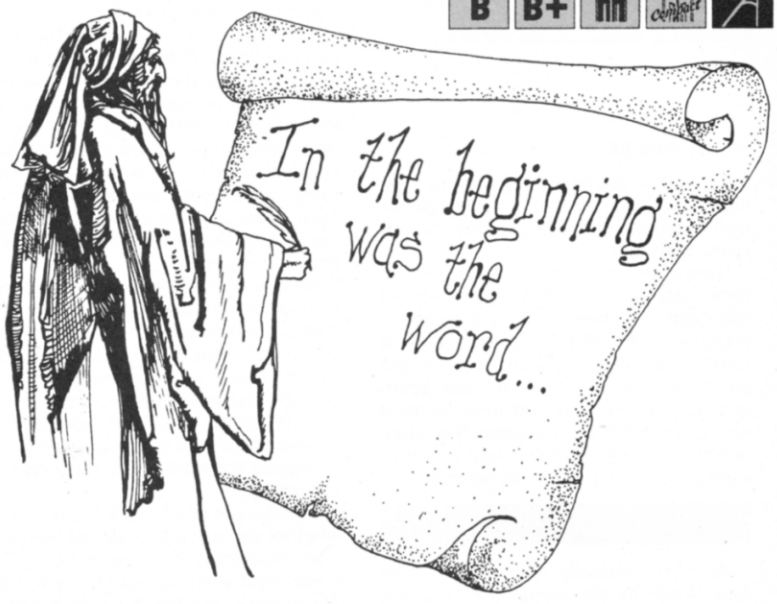

Pete Gerrard continues his quest into writing adventures

AFTER our excursion into the realms of programming and text compression, most of you will be relieved to know that we're not going to be doing much programming this month. Instead, we'll take a look at screen layout.

You might have the cleverest adventure program in the world in your computer, but it will be to no avail if the display on the screen drives the player shrieking into a corner.

Look at the way masters do it, think of your favourite adventures and what attracts you to play them. Obviously the structure of the game and the atmosphere created will play a great part, but an attractive screen layout can help to make all the difference.

At the top of the screen you sometimes see what is referred to as a Status Line, which tells you a number of things about the state of the game.

First, you are usually informed of your current position in the game, useful if you happen to have been stuck in a location for several moves trying to solve a seemingly impossible problem. One can always redescribe a location description of course, but a quick glance to the left hand corner of the screen is a lot easier.

Second, you are also usually told of your current score (in depressing terms like 3 out of 400 or something like that) and if the game requires a set of problems to be solved in a given amount of time, you might also notice the passing time up in the top right hand corner of the screen.

So, how might we go about emulating this status line, leaving the rest of the screen free for the usual display of room descriptions, what now prompts and answers to the player's input.

First let's look at the problem of the room descriptions displayed in the top left hand corner of the screen. Obviously we aren't going to be able to display the entire description but a location which might greet the player with the words:

```
You are standing outside the old
stables. The battered wooden door
bears silent testimony to your
barbaric entrance and the dusty straw
lying in heaps on the floor would
suggest that no one has visited here
for quite some time. An all-pervading
smell reminds you of the country
around your home and you long for
freedom and liberty.
```

This can reasonably be reduced to:

```
You are just inside the old stables.
```

Or even better:

```
Just inside the old stables.
```

In many games you will want to print up the detailed room descriptions when the player first enters and only use it again if the player specifically requests it. On a subsequent visit you simply print up the message "You are" followed by the short description.

Other characters may be blundering about, so one could use that same short room description to something like:

```
Wyatt Earp is (wherever)
```

Should Wyatt Earp choose to visit there for his own nefarious purposes.

Taking the Western adventure as our example, you might recall that we had some 64 locations. So we need 64 short room descriptions, which might be read in like this:

```
  10 DIM sd$(64)
  20 FOR I%=1 TO 64:READ sd$(I%):NEXT
     (rest of program)
1000 DATA"at the edge of town."
1001 DATA"approaching town."
     (rest of short descriptions)
```

sd stands for Short Description. You could then file all these descriptions onto tape or disc, using:

```
30 Y%=OPENOUT"SHORTS"
40 FOR I%=1 TO 64
50 PRINT#Y%,sd$(I%):NEXT
60 CLOSE#0:END
```

These could then all be read in by the main program, replacing PRINT# with INPUT# and whenever the player reached a current position of CP, the short room description sd$(CP) could be used to tell the player where he is. To save space you could even include the short description in the compressed text file in a block of messages from, say, 65 to 128.

In a quest that simply requires the collection of treasures, scoring is easy. Most games nowadays however, do not rely on a simple treasure hunting expedition so if you're going to include scoring it is probably best to award a certain number of points for each problem that is correctly solved.

Never ignore the aspects of humour when keeping track of the score. Instead of behaving sensibly, I've seen adventure games that keep track of a football match, so that every time you type in SCORE you were told how well the game was going, your own progress having been completely forgotten.

Apart from scoring, you might want to display the time on the status line as

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◀ *From Page 91*

well. Fine, if you're playing a game that has a deadline, otherwise you might as well leave the passage of time to your room descriptions.

Having got the short room descriptions, the scores and the clock sorted out, displaying them is no great problem. Using whatever method you like, allow a field of perhaps 25 characters for the short descriptions, nine for the score and six for the time and bear in mind where the text is on the status line when positioning the cursor. You wouldn't want to tell the player that he was:

```
In front of a gaping quarter to six
```

We have casually mentioned in the past some of the words that you are likely to encounter when playing or writing adventures, so let's now look at this in more depth.

Common words serve more than one purpose: They make life a lot easier for the writer if you include a dozen or more words that are the same in each of your adventures.

This gives you a good few k's worth of code before you start and a grand excuse to slope off to the pub after five minutes, saying grandly to yourself "Well, that's today's work done!"

It also gives the player of your (and other) adventures a sense of familiarity. One often-voiced complaint about adventure games is that a lot of time is spent searching for exactly the right word to use.

Most adventures rely on the four compass points North, South, East and West, along with Up and Down, for movement in the game. You may care to use things like port and starboard, rimwards, anything, but if you're going to use something out of the ordinary do remember to tell the player. We're not all expert navigators.

Putting out an adventure without Save and Restore is one of the few crimes still punishable by death, being treason as far as the adventurer is concerned.

Restore is a much better word than Load, since (particularly in a Western adventure) players will want to Load Gun and few of us call a saved position by the name Gun even if we're allowed.

Get and drop are used for the manipulation of objects, but be very careful here. Someone might use the word Take rather than Get and to them Take Medicine would only imply picking the bottle up but to you it might mean swallow everything and reduce the player's size to that of an undernourished microbe.

Consequently, I try to use both Take and Get, with the code for the two being almost but not quite identical. Drop is much easier, although again you might like to use Discard or Place, since anyone who drops a Ming vase on to a hard floor is asking for trouble.

Players will try to wear the most unusual things in adventure games. You might find that their patience is wearing thin, so with words like Wear and Remove, essential though they may be, take great care. Discard and Remove could almost be treated as the same thing, but as with Take and Get you will have to ensure that a number of checks are included to weed out the anatomical impossibilities.

Help and Inventory are found in most games. Help I usually leave till the bitter end because I'm not a great one for giving any help in adventure games. If there's some spare memory left, fair enough, put in one or two help routines to encourage the faint hearted. But always make sure that your program will recognise the word, even if it does nothing useful.

Inventory is much more important and whether you use it as a simple verb of its own (Inventory) or a noun as in Take Inventory it should always be included. If the player's wearing the suit of armour, tell him. If he's wearing the tin of beans, fetch the men in white coats, but do include some way of displaying whether things are being worn or carried.

Always try to put in as many different versions of the same thing as you can. Some people may like to use the word break, others may prefer smash, yet others might like to try to kill, maim, destroy, or whatever.

But at the risk of repeating an old warning, cater for swear words by all means but do not have them printed out as part of your program. Recognise them, but don't use them. You never know who might by playing the game.

Verbs are usually suggested more by the problems that you see than by the room descriptions, which tend to set up the various nouns in the game. If, for example, you had a problem that required the player to type:

```
Look under the mat
```

The word Mat would obviously become one of your nouns.

This choosing of verbs and nouns is terribly important. Some companies may boast that their games have a vocabulary of 800 words or more but there's no need to include every possible alternative of GET in order to have a large vocabulary.

Words like THE and A, as we saw before, are eliminated anyway so we are dependent to a great extent on the room descriptions and the problems set.

Anything else is, really, just the icing on the cake. If the player can look at everything mentioned in a description and can type in exactly what he needs in order to solve the problems and complete the adventure, what more does he need? He needs that which makes the difference between a bad and a good adventure.

From the descriptions and problems, you will get most of your verbs and nouns. However, as we saw in the article on parsers we are not just limiting ourselves to a simple VERB ... NOUN input. Although we are not going to approach the so-called sophistication of some games, we will nevertheless advance significantly from VERB ... NOUN form. By judicious use of a vocabulary list we will be sophisticated enough to present the player with some complex problems.

Suppose one of the problems involved looking under the mat, but there were three mats to choose from. Each was a different colour, red, blue and green. The player might type in something like:

```
Look under the green mat
```

We can cope with that and our verb is Look, the noun is Mat, the word Under becomes a link word and green becomes an action word. Having found the key, the player would naturally want to open a door and so he might type in something like:

```
Turn the key in the lock
```

Discarding the two the's, we would have the word Turn as a verb, the word Lock as a noun while Key becomes a link word and In becomes an action word.

Link words are a little more complicated and need to be understood properly if we're going to get the best out of our parser. Generally, for every noun and action word you will have a corresponding link word. In other words, if you had 120 nouns and 25 action words, you would probably have at least 145 link words.

A player could:

```
Crawl under the door
```

In this case we don't have an action word, merely verb ... link ... noun, but since Under is an action word it will also have to be a link word as well. In other words, at the very least you will have to duplicate every action and noun into a link word. You may also find a few links of their own creeping in but that will depend on you and your adventure.

It will also depend on the problems that you set the player. When first devising your finished (it never will be!) vocabulary list it is worth printing out all the room descriptions and all the problems in order of correct solution.

By now, you should be in the position of having all your room descriptions and your map neatly drawn up. You should know what all the problems are and what all the solutions are as well. We cannot proceed until that vitally important area has been sorted out.

Now you are in a position to draw up your complete vocabulary list. It, like the map and the problems, will expand before we're finished. You can also sort out all those short room descriptions as well, since they are going to be needed in the finished game.

● *So, be prepared for a return to programming next time.*

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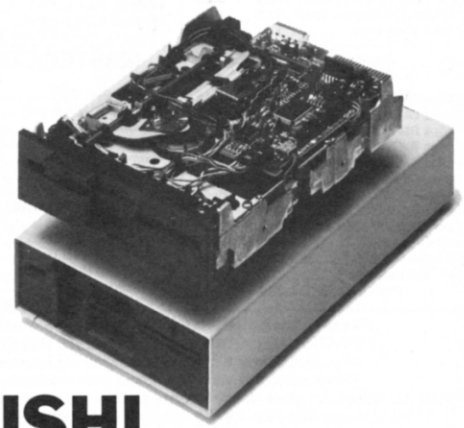

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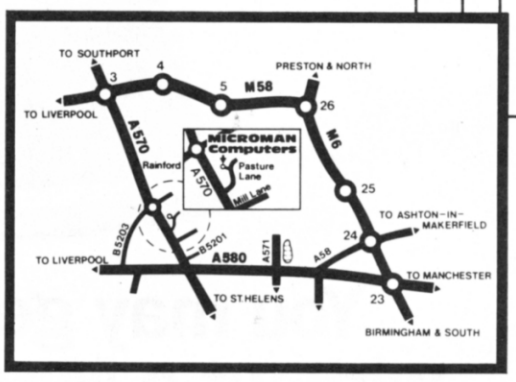

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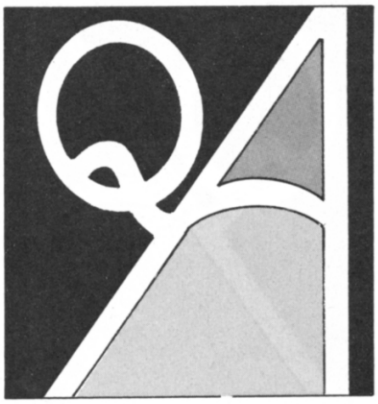

We are receiving a large number of questions about the Acorn Archimedes. Some are answered here, and we will be answering more over the next few months.

So, if you have any questions about the new super micro from Acorn don't hesitate to send them to: Archimedes Questions, The Micro User, Europa House, 68 Chester Road, Hazel Grove, Stockport, SK7 5NY.

Q I have a lot of software for my BBC Micro written in Basic with some 6502 code in them – will these programs run on the Archimedes in the 6502 emulator?

A *Acorn say that any legally written software that runs on a BBC Micro 6502 second processor or Master 6502 co-processor will work on the Archimedes 6502 emulator. But experience has taught us that some FX commands (for example FX16 and FX119) are not implemented and generate a bad command error. Any software that uses these will fail unless the calls are removed.*

When the analogue/joystick podule becomes available the FX16 command will probably work again.

Q Can my machine code programs use all of the memory in the 6502 emulator or am I stuck with Basic and 48k?

A *Although the operating system insists that HIMEM is at &8000 you can use 60k of memory from &800 all the way up to &F800 (writing all over Basic) for your programs. Basic can be recovered using *BASIC as normal.*

Q Do I need a new printer or a new printer lead for the Archimedes?

A *You can use the printer you already have, but both the RS423 and Centronics connectors on the Archimedes itself are different. So for either a serial or parallel printer you will have to get the micro end wired to a new plug.*

Q Since the Archimedes has so much memory, does it have a built-in printer buffer?

A *A printer buffer does not come as standard but it would be quite easy to implement one as a software module.*

Q Can I plug a television into my Archimedes?

A *There is no TV output on the Archimedes and the expense and complexity of adding the necessary circuit makes it easier to use a monitor. In addition, a TV would not be able to handle the quality of screen resolution in the better screen modes.*

Q Will previous *Micro User* listings work on the Archimedes?

A *There's no blanket answer to this question. For example, none of the machine code games that use direct screen memory addressing will work. Pure Basic programs will, in general, work unless they interfere with system memory directly, such as program relocation routines or storing data in page &C. Most programs can be made to work with very little modification.*

Q Are software companies likely to release upgraded versions of their old games for the Archimedes?

A *We spoke to a leading software house who said that considering the outstanding capabilities of the Archimedes and the prestige in owning one, only the very best software is worthy of translation and even then it would have to be vastly improved. So most good games will be totally original and too complex for conversion to any other micro.*

Q Is Archimedes' Basic V available for the BBC Micro?

A *We have heard a rumour that Basic V will be made available for the Archimedes' predecessors but we are not in a position to confirm this at present.*

Q My BBC Micro gets very hot due to all the add-ons I have. Can the Archimedes' power supply take many add-ons?

A *The power supply in the Archimedes is designed to handle a lot of extra loading in the form of add-on podules and the cooling fan mounted in the side should ensure that no overheating occurs.*

Q There is a great deal of business software that works on IBM computers and their clones – will these programs work on the Archimedes?

A *Acorn do intend to produce a podule to give IBM compatibility.*

As a matter of interest Acorn has a product called Springboard which will make IBM machines Archimedes compatible.

Q Can you please explain in layman's terms how fewer instructions in the ARM chip means it is more powerful?

A *Microprocessors like the 68020 and 80386 have hundreds of instructions so these chips take a long time (as far as chip speeds go) to decode which instruction is currently being executed. But most machine code programmers don't use the very complicated instructions available – they only use a few simple ones – and having them available on the chip is actually a waste of time.*

The Reduced Instruction Set philosophy says: Put only a few simple instructions on the chip, each of which can be carried out very fast because they are all simple.

The end result is that the chip is simpler and cheaper to make but goes very much faster and is thus more powerful – and still contains all the instructions a programmer needs.

Q My BBC Micro only has about 28k for Basic programs (using Mode 7). How much memory do I get for Basic in the Archimedes?

A *In the Archimedes 305, which has 512k user ram in total you will get at*

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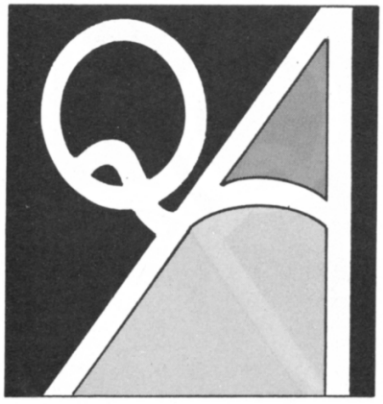
◀ *From Page 97*

least 200k for Basic programs as the default – and you don't lose any using the high-resolution graphics modes either.

The amount of ram given to each section of the system – screen, modules, fonts, sprites, system work area – is all configurable, so it is possible to give more user area to Basic if you need it by reducing the memory for the other areas. On a Archimedes 310 the maximum user work area can be 830k.



Q Does adding software modules reduce the amount of user memory in the Archimedes?

A *No, the user memory is fixed by the current configuration of the system – but the space available for modules and their workspace is reduced when a new module is added.*

Q What happens if I try to use one of the special screen modes when I don't have the correct multi-sync monitor?

A *To use Modes 18, 19 and 20 the system requires some additional internal hardware as well as a special monitor and if this is not fitted the screen defaults to Mode 0 with no error generated. If the circuit is fitted and a multi-sync mode selected with a normal monitor the screen will just display interference.*

Q If I select a shadow screen mode using, for example, Mode 128 what happens?

A *Strictly speaking the Archimedes does not have shadow ram, but the operating system allows you to have two screens in memory at one time and you can switch between them, just as if it were shadow ram. This option requires twice the amount of screen memory to be available.*

Q Can I use my 3.5in ADFS discs in the Archimedes?

A *Yes, the Archimedes ADFS supports the 640k standard ADFS disc format used on the Master, Compact and Electron Plus 3. But the Archimedes ADFS has a more advanced disc format which can store 800k per disc. The ADFS detects automatically which format the current disc uses.*

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Your technical questions answered by MIKE COOK

PROBLEM SOLVED

Time loss

COULD you explain an intriguing and frustrating idiosyncrasy of the Master? It concerns the on-board clock: Why does it lose anything up to 40 or 50 seconds a month? – **Mik Little, Lyneham, Chippenham.**

● *The problem is that the clock is not properly trimmed. IC11 is the real time clock, type 146818. Close to it is a trimmer capacitor, VC1, which can be adjusted to make the clock keep better time.*

Starting up

I HAVE a BBC Micro fitted with sideways ram. Some protected games discs lock up if the machine is switched on from cold. However if I place a file into the sideways ram and Shift+Break a games disc it works without any problem.

Is this normal and is there any way I could run these games without loading a file into the sideways ram or perhaps switch off the sideways ram before auto booting the disc? – **F. Beach, Stanmore, Middx.**

● *When a sideways ram is first switched on, it contains what is known as a switch-on garbage. This tends to be different on varying rams but will normally be consistent on any individual ram.*

What appears to be happening is that the switch-on garbage header is fooling the operating system or game into thinking it is a valid program. When an attempt is made to issue a service call to the ram the system crashes.

No, this is not usual although it is not entirely unknown. You could try changing the chips around on the board or replacing them with different ones or just keep on loading a valid file into it as you are doing now.

Disabling the board depends on the type of board you've got.

Hangover

MY daughter bought Impossible Mission by Epyx a short while ago but it won't run beyond the initial header. We have a Viglen unit with twin disc drives and the keyboard at the end of a curly cord. I borrowed another micro in its original case and the game ran perfectly.

By a process of hardware exchange between the two set ups I traced the problem to the curly cord or so I thought. But a thorough check of the curly cord revealed nothing physically wrong.

I then asked a couple of friends to play the game on their machines with the Viglen conversion and in both cases the game hung up at the same stage.

I rang the software house and explained my problem, but they said if the game runs on a standard machine the software is okay so it's not their problem.

Can you explain what is happening? – **B.H. Ward, Braintree, Essex.**

● *The curly cable used by Viglen introduces a slight delay or loading on the signals sent to and from the keyboard. Usually this is not a problem due to the way the keyboard is read by the computer. However some techniques used in software protection or games will not work with the extra loading introduced by the cable.*

When I phoned Viglen about this they were quite unrepentant and blamed the software house for breaking the rules in their program.

Who is to blame? Well, as in most cases like this, the innocent stretching of the computer specification in two different directions has resulted in the computer "snapping". So neither and both parties are to blame and as usual it is the consumer in the middle that takes the rap.

Printer poser

I bought an IBM personal graphics printer without a manual. I know it was probably stupid but it is an Epson compatible (or I should say it is a relabelled Epson). I have done some research and it seems that the printer is an Epson/IBM MX-80 (tractor feed only).

I have an Epson FX-80/FX-100 printer manual. The problem is I can't do any screen dumps with it. It prints text in draft, double strike, enlarged, emphasised and condensed but no elite or italics. I am interested in using it for screen dumps. What am I doing wrong? – **Mark Pritchard, Needingworth.**

● *A printer is a small computer system containing a microprocessor plus memory and the way it operates is controlled by its software stored in rom. What Epson does is sell its printer mechanism to different companies with rom software customised to the clients requirements.*

I suspect that IBM has no interest in graphics and so the graphic commands were not implemented. Perhaps the spare room in the rom was used for some other IBM-specific function.

However, it should be possible to convert it to a standard Epson printer by replacing the rom. An Epson service centre may be able to supply you with one. The address of Epson UK is Dorland House, 388 High Road, Wembley, Middlesex. HA9 6UH.

Body building

*WOULD you tell me whether it is still possible to buy the Body Building heart rate monitor for use with the BBC Micro or if it is possible to obtain the kit. – **F. Dickinson, Sheffield.***

● *A lot of old Body Build kits are still available from Musbury Consultants 8 Fairhill, Helmshore, Rossendale, Lancs. BB4 4JX. The heart rate monitor (April 1984) costs £19.00 as a kit and £25.50 assembled.*

Voltage conversion

I HAVE just returned from Saudi Arabia with an Epson RX80 printer that I bought out there.

The printer is 120 volts and I am using it with a voltage transformer. Can I convert it to 240 volts? – **D. M. Jefferson, Scarborough, North Yorkshire.**

● *It should be possible to convert your printer to 240 volts. Some transformers are multi-standard and require a link to be changed inside the printer. If your printer contains the single voltage type, it will be necessary to replace it. See the contact address for Epson UK above.*

Crusher control

I AM a pupil at a school in Worcester and I'm doing a soft drinks can crusher project.

I need to have several failsafe devices in the system, which include an induction circuit to sense the presence of a can and a micro switch. This will be connected to the door of the system to make sure that it is closed when the crushing takes place.

The crusher will be operated from an electronic/pneumatic interface. After the can has been crushed, it will be passed over a sensor to trigger a motor which will dispense a penny coin in payment for the can.

I have had trouble integrating these

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Your technical questions answered by MIKE COOK

PROBLEM SOLVED

◀ *From Page 99*

separate systems, so could you please send me an idea of the circuit I would need to fulfil these requirements. Or, alternatively, should I just use the BBC Micro port as a control for the circuits? – **Guy O'Keefe, Worcester.**

● *Any operation that can be performed by computer can also be performed by a sequence of logic gates. However, designing logic circuits is a topic which could cover a whole book, not just a reply to a letter.*

As this is a computer magazine let's look at the computer solution. Past Body Build articles hold the clue to your problems: Controlling DC motors (November 1985), Inductive sensor (June 1986) and Reading switches (July 1983).

Once you have control of these from the user port a simple Basic program should be quick enough to provide control.

Colour change

OCCASIONALLY the black background on my TV display develops a pale green/yellow cast which sometimes lasts up to a minute.

Also the top pin of my print head doesn't work making the text difficult to read. – **J. Coates, Leominster, Herefordshire.**

● *The cast on the picture is due to an absence of Red signal. This could be a faulty lead or connector at the computer or monitor end. Alternatively it could be inside the monitor circuit.*

The print head fault can be rectified by cleaning or replacing the print head. Alternatively the Darlington drive controlling the top solenoid may have gone faulty and should be replaced.

Colour contact

WHEN I bought my BBC Micro I had to push the UHF lead down so I could get colour. Different leads didn't work until I pushed them down when I got monochrome but not colour. What's going wrong? – **K.V.S. Rajasmsi, Heston, Middx.**

● *It is not the lead but the UHF modulator that is faulty. This is the small tin box in the top right hand corner of the computer.*

Normally what happens is that the central core of the plug is not making good enough contact to produce the strong signal required for a colour picture and the colour killer circuit in your TV set is being activated to produce a monochrome image.

The simple solution is to take the lid off the modulator and crimp up the socket so that it makes better contact. Failing that the modulator is quite cheap (under £10) and is Astec type UM1231. They are available from any good electronic component supplier.

Compact tape

I OWN a BBC Master Compact and, as a former Electron owner, I have a few BBC/Electron games on tape.

I was looking through the * commands you can use on the Compact when I came across *TAPE. Does this mean I can use a tape recorder on my Compact? – **Steve Peters, Swansea.**

● *The Compact will accept the *TAPE command but will not do anything with it. There is no tape interface inside the machine or tape driving software in the operating system. The command is simply left over from other versions of the operating system and is probably included to prevent error messages when running existing software on the Compact. As there is no *TAPE command on the Archimedes it has been suggested that Acorn is phasing it out.*

Lacking power

WHEN I switch on my BBC Micro the Caps Lock light goes on then turns off and a continuous tone is present. If the machine is switched on and off about 20 or 30 times, it powers-up correctly.

Once the machine has been switched on you can turn it off and on again without any problem. I have been told that it could be the voltage regulator. – **Shaun Howitt, Spalding, Lincs.**

● *Your problem could indeed be the power supply. This is a switch mode type and there are components in the circuit to kick start it into action.*

Unfortunately information about the supply is hard to come by and the components it contains are hard to obtain, so the only practical solution is to replace it. However at £60 this is not cheap.

Make sure that it is the supply by carefully measuring the voltage across the red and black wires coming from it. If this is within a quarter of a volt of five volts when the computer is switched on but not working then there could be another problem.

A fault like yours can also be caused by an intermittent connection, the most likely place is the keyboard connector or a faulty IC socket.

Just a tick..

HAS *The Micro User* ever published details of a real time clock for the BBC Micro using the Dallas Semiconductors, battery-backed Smartwatch module? If not, could such a project be considered for the Body Building Course? – **Jonathan M Mott, Manchester.**

● *The real time clock published in February 1984 of* The Micro User *used the MM58174 chip, there's not much point in publishing another as that works well and now several commercial real time clocks are available.*

IBM compatible?

IS IT possible to fit an IBM hard disc to a BBC Micro and if so could you please supply me with the details? – **R. Banham, HMS Tamar, BFPO 1.**

● *Fitting an IBM hard disc drive to a BBC Micro sounds most attractive. Unfortunately it is quite a big job. First of all you need a motherboard and interface to connect it to the 1 MHz bus, then you need the software to drive it.*

None of the existing disc filing systems will cope so a new one will have to be written. After you have done all that there is not as much saving as you would think. I am sure that someone will do it one day and when they tell me about it I will let you know.

Body building

I AM writing in connection with the Body Building Course article featured in the January edition *The Micro User*.

A previous Body Building article gave an insight into the uses of conductive foam. Why not use this foam as the drum pad? This way the force with which the "drum" is hit could be read as it is analogue and the volume of output could be changed accordingly. – **David Griffiths, Wenvoe, Cardiff.**

● *This is a good idea but I have not had time to try it. My only concern is that the analogue input port will not be fast enough to register the sharp peak produced by hitting the foam.*

You could use the fast A/D converter described in the February 1987 issue but you would then have the problem of knowing where in the peak to take your sample. Most Bodybuild articles are intended as a springboard for your own applications: If any reader has tried this then please let me know.

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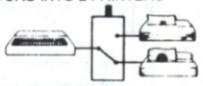
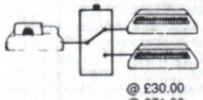
1 MICRO INTO 2 PRINTERS



1 PRINTER INTO 2 MICROS



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System 1	Standard Package	£349
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RS232 Kit for BBC Compact **£26**

Additional 3½" Drive for BBC Compact **£99**

(Securicor carriage £7)

The 80186 Co-Processor

This package consists of the Master 512 board, Watford Co-Pro Adaptor, Acorn 1770 Disc Upgrade and Acorn ADFS. The Master 512 board using the 80186 16 bit Processor at 10MHz and running Digital Research DOS Plus, gives a high degree of IBM compatibility at an extremely reasonable price. Included in the 512k package is a mouse and the amazing Digital Research GEM suite of software; GEM Paint, GEM draw and GEM desktop giving a complete Mouse Icons environment (All other GEM packages will work on the 512k). Famous packages that will work with the 512k board include Wordstar, Dbase II, Lotus 123 and many others. The only requirement to upgrade any BBC Model B to this system is you must have twin 80 track disc drives.

£275

ARCHIMEDES Micros

Model 305

Basic System	£799
with Green Monitor	£849
with Colour Monitor	£999

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with Colour Monitor	£1075

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Epson FX800 Printer	£315
Epson FX1000 Printer	£439
Epson LQ800 Printer	£429
Epson LQ1000 Printer	£585
Epson LQ2500 Printer	£790
Epson LX86 Printer	£189
Epson LX800 Printer	£210
Epson SQ2500 Printer	£899
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FX/LQ/LX800 Single Sheet Feeder	£135
FX/LQ1000 Single Sheet Feeder	£149
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LQ800 Tractor Feed Unit	£39
LX80/86 Tractor Feed Unit	£20
LX80/86 SingleSheet Feeder	£49
Hitachi 672 Colour Plotter	£495

(Securicor Carriage on Printers £7

PRINTER SHARERS

(Ideal for School environment)

Connects	Serial	Centronics
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3 Printers to 1 Micro (Centronics) **£65**

(Cables extra, specify type required when ordering)

65C102 2nd PROCESSOR

This amazing package consists of the Acorn 65C102 'Turbo' Board, the Watford Co-Pro Adaptor and Acorn 1.2 DNFS ROM. The 'Turbo' board, running at 4MHz with 64k of additional RAM will increase the speed by between 50 and 200% depending on the application running, and allow a BASIC program of upto 44k in any screen mode. Simply by plugging in the Co-Pro and the DNFS ROM with its special Tube host code and you massively increase the power of any Model B.

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EPROMs for BBC's Sideways ROMs.

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Centronics lead to connect BBC micro to EPSON, KAGA, SEIKOSHA, NEC, STAR, JUKI, BROTHER, SHINWA, Panasonic etc. printers.

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IBM Parallel 1 metre Cable	£9

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LQ2500	£9.00	£5.50
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(Now IBM/Epson Compatible)

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- TAXAN KX119 Ultra-Hi-Res Amber Monitor **£90**
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Green (New Design) Hi-res	**£69**
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N.B. carriage on Monitors **£7** (securicor)

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By placing your monitor on one of our superb swivel bases, you gain the freedom to adjust the monitor viewing angle to suit your needs. By doing this, you alleviate eye strain and reduce back stress. Front adjustable without lifting the monitor.

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MEGABUFFER 256

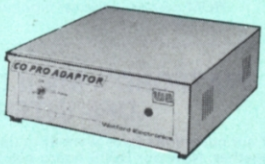
This new Megabuffer 256 from Watford is a full featured 256K Printer Buffer. It allows the computer to print 256,000 character in a short time thus freeing the computer very quickly. In short it makes light work of printing large documents, screen dumps, etc. It is extremely simple to connect. The features are:

- Low Cost, High performance.
- Improves efficiency by making more efficient use of computer and printer.
- Compatible with any computer and printer that uses Centronics Parallel connections including all BBCs, IBM PCs, etc.
- Total compatibility with all software.
- Cheaper phone bills when using your Modems.
- Ideal for those doing large graphics screen dumps that are slow to print.
- Multi-Copy facility allows you to print several copies via Megabuffer without going through your computer.
- Data Dump facility is included.
- Built in test unit for both the buffer & your printer.

In conclusion it can safely be said that MEGABUFFER 256 is the ultimate printer Buffer for both the amateur and professional user.

Only £125 (carr £2)

CO-PRO Adaptor



Now for the first time you can add the Master Co-processor boards, to your standard BBC model B, or B Plus. With this brand new launch from Watford Electronics you can attach any BBC Master co-processor to the original BBC Micro. Once again Watford strides ahead with a new concept in BBC B Micro add-ons. This unique external Co-Pro Adaptor, is protected by patent applications.

Use the super fast Turbo Board with your BBC B, it is much faster than the 6502 2nd processor superseding it.

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To use other co-processors you require a BBC B with DNFS 1.20 or higher, or BBC B+ fitted with 1770 DFS 2.20 or greater. Co-processors work exactly like a second processor.

Master owners may use Co-Pro to add a second Co-processor externally.

Watford, brings power to your BBC at only:

£50.00 (carr £5)

Continued

THE EPSON RX-FX-KAGA PRINTER COMMANDS REVEALED (BOOK)

So you bought yourself a new printer, because the salesman in the shop showed you how clever it is and impressed you with all sorts of printouts to show its capabilities – he may even have offered you a special price.

However, now that you have got it home and connected it to your BBC microcomputer, you are wondering how to make it perform these magical tasks. The manual seems to give no clues, and when you type in the example programs, the computer throws the LPRINT statements back in your face.

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This book describes in plain, easy to understand English, how to use and make the most of your KP810, PW1080A or any other Epson FX80 compatible Printers like Panasonic KX-P1080/1, etc., with the BBC Micro, both from BASIC and Wordwise.

It describes in detail how to obtain the maximum in graphics capability from your printer and includes full indexes allowing you to cross index the numerous commands. Every command is explained in detail, with an accompanying BBC Basic program and an example of its use from Wordwise.

£5.95 (No VAT)

NOW WITH EXTRA FEATURES AT NO EXTRA COST – Watford's latest DFS 1.44

- Incorporates Acorn's Official Tube Host Code so that those with 2nd processors no longer need to waste a ROM socket on the DNFS.
- Option to DOUBLE the speed of BPUT and BGET.

If you already have the Watford Electronics DFS and wish to incorporate these new facilities then simply return your existing DFS ROM to us together with £5 remittance for an upgrade. Please pack the ROM securely and address the package to our Upgrades Dept.

WATFORD's & ACORN's SINGLE DENSITY DFS

Watford's popular and widely acclaimed DFS has now been available for four years, and has gained a large following amongst serious users of the BBC Micro. Owners of Acorn or any other standard DFS can upgrade to our "Ultimate" DFS merely by replacing their DFS ROM. See below for this upgrade. ***(P.S. Watford's highly sophisticated DFS is fully compatible with Acorn DFS). (not Acorn's 1770 DFS)***

- *Complete Disc Interface Kit including DFS ROM and fitting instructions* **£54**
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  (P.S. Our comprehensive DFS Manual covers both Acorn & Watford DFSs).
- *Watford's sophisticated DFS ROM only* **£16**
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- *Watford's DFS is exclusively available from Watford Electronics and their appointed dealers only. Every ROM carries a special label with LOGO and serial number.*

NEW WATFORD's Mk II Double Density DFS INTERFACE

Many of our customers have wanted to use our superior DDFS and Acorn ADFS together. Now our DDFS board has been adapted to allow the use of Acorn ADFS.

Added features include:

- Acorn ADFS compatible – Use ADFS on our DDFS board.
- Tube host Code – No longer any need to have the DNFS in your machine to use Co-Processors, even the CoPro and Master 512.
- Auto 40-80 Track sensing – no need to fuss with 40/80 track switches (even works with protected disks).
- An extremely powerful 8271 emulation – ensuring compatibility with almost all software.
- New low profile – small footprint board.
- Fits with all third party ROM boards.
- Option to double the speed of file handling operations – BPUT and BGET.
- Operates in both single and double density modes.
- OSGBPB has been recoded, increasing still further the speed of file handling.

Please note that not all DDFS's are capable of providing either the full 80% storage increase or of allowing a file the full size of the disk – Ours allows both of these!

If you already have a DDFS (any manufacturer), and wish to upgrade to our MkII version, then simply return your existing ROM and DDFS board and we will supply the new DDFS for only £30.00.

- Special introductory offer **£39.00**
- DDFS Manual (No VAT) **£6.95**
- We will exchange your Existing DFS or DDFS for our DDFS for only **£25.00**

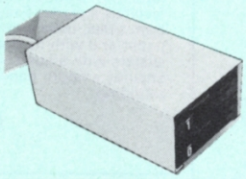
Please note, as the MkII DDFS is a hardware and software upgrade, it is not possible for existing Watford DDFS users to simply exchange their ROM for the new version.

SPECIAL DISC DRIVE/DDFS OFFER

Type CLS400

- The popular Mitsubishi 400k Single Disc Drive, Double Sided, cased with Cables. Plugs directly to your Micro.
- Watford's popular DDFS Disc Interface (allows 720k storage). Will run in both Single and Double Density modes 40/80 track Software switchable.
- A comprehensive User Friendly Manual.

A Bargain at Only **£125** (£6 carr)
(Offer valid while stocks last)



3½" TWIN 800K DISC DRIVE OFFER

These top quality 3½" Disc Drives are attractively finished in BBC beige and are supplied complete with Cables. They run directly from the BBC B/Master's own PSU.

Special Offer **£126**

DISC DRIVE SHARER

(Ideal for educational establishments)

At last, a low cost alternative to the econet system. Watford's Intelligent Disc Drive Sharer allows you to connect 3 BBC micros (model B, B+ and Master series) to a single or double disc drive. Running under any DFS or DDFS, this intelligent unit will automatically queue the computers. Each computer has a status light dedicated to it. If it is green you will get immediate access to the disc, and red means that you are next in line.

The unit plugs directly into the disc drive socket on each computer and is powered by the mains. (N.B. Not compatible with ADFS.)

Launch Price: **£59** (Price includes 3 Cables)

MYSTERIES OF DISC DRIVES & DFS REVEALED (BOOK)

Are you tired of faulty cassettes, and lengthy loading times? Do you want to upgrade your BBC micro to take discs but you get tied up in the plethora of jargon surrounding the choice and use of these systems.

Then The Mysteries of Disc Drives and DFS Revealed is the book for you. It explains in detail the different types of systems available, how they are installed and how to use them. Many examples are given including pre-written programs to call various functions of the DFS available only through Operating System calls. Different types of disc, 40/80 tracks etc. are all explained. This book is ideal for the beginner confused by the plethora of choice available in the marketplace.

£5.95 (Book No VAT)

DISC ALBUMS

Attractively finished in antique brown leather look vinyl. Stores upto 20 Discs. Each disc can be seen through the clear view pocket.

£4

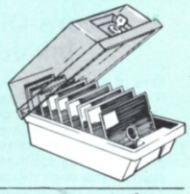
FLOPPY HEAD CLEANER KIT

The heads in floppy drives are precision made and very sensitive to dirt. The use of a cleaner Kit is a sensible precaution against losing valuable data. It is recommended to clean the drive head once a week. It is very simple to use. Available in 3½" & 5¼", please specify.

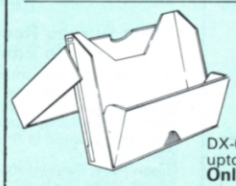
£7

ANTISTATIC LOCKABLE DISC STORAGE UNITS

Gives double protection –
Strong plastic case that affords real protection to your discs. Antistatic helps avoid disc corruption whilst in storage. The smoked top locks down. Dividers and adhesive title strips are supplied for efficient filing of discs.



- **M35** - holds upto 50 5¼" discs **£6.50**
- **M85** – holds upto 95 5¼" discs **£8.00**
- **M50** – holds 50 3½" Discs **£7.50**



PLASTIC LIBRARY CASES

◀ Holds up to 10 5¼" Discs. **Only £2.00**

DX-08: This extremely handy unit holds upto 8 5¼" Disc while in use. **Only £2.00** ▶

DUST COVERS (For our Disc Drives)

Single CLS (without PSU) **£3.20** Twin CLD (without PSU) **£3.85**
Single CS (with PSU) **£3.95** Twin CD (with PSU) **£3.90**

Quality Disc Drives from Watford

To help you decide which drive is the most suitable for your needs (and your pocket!), we have produced the table below.

The first capacity given in the first column indicates capacity in single density mode. That within the brackets is the capacity in double density mode. All disc drive type numbers start with the prefix "C".

The tinting on some of the boxes is used to indicate which Drives are 40 track (non-tinted) and which are 80 track (tinted). All our 80 track drives are already fitted with a 40-80 select switch.

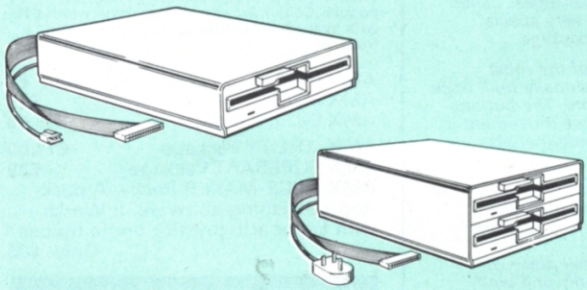
All our Disc Drives are Double Sided and will operate in both Single and Double Density modes. *Extensive experience of the usage of disc drives suggests that the JAPANESE drives currently represent about the best in terms of speed, reliability and overall "elegance" available for the BBC Micro.*

Various other "manufacturers" of disc drives for the BBC micro (more accurately, "packages" label other manufacturers drives with their own name). We buy the high quality JVC and Mitsubishi drives in large quantities directly from the manufacturers, package them and sell them at "dealer" prices direct to the public.

If you look around the popular BBC micro press, you will find that the prices we quote for the top quality, new slimline disc drives are, virtually without exception, some of the best around. These prices, coupled with the backup of one of the country's largest distributors of BBC peripherals provides a superb deal.

Unless you anticipate using dual drives in a fully expanded BBC system for long periods of time with little ventilation, then we suggest that our range of "CL" disc drives without the PSU (Power Supply Unit) would be quite adequate (extensive tests within our workshops have confirmed this). All drives are supplied complete with a SPECIAL UTILITIES Disc, Cables and Plugs. The Drives with power supply have a mains moulded plug for safety purposes. Ideal for Schools & Colleges. We are now able to supply all single disc drives with Power Supply, in either single or dual case. (Dual case has a twin data cable and a power supply capable of driving two disc drives) allows easy expansion to a dual drive unit, at a later date. Prices stated in the pricing boxes below are for single drives in standard single cases. Single drives in a dual case cost an extra £5. (At Watford we anticipate your needs of tomorrow, not just today)!

When using a BBC Micro, most people find themselves short of desk space. The Watford's BBC Micro plinths form an ideal way of recovering some of this precious space) your BBC, Disc Drive and Monitor can all occupy the same vertical footprint and still be comfortably situated. With the Watford Double plinth, your Disc Drive is mounted vertically at one side, leaving a very valuable area directly in front of you for such useful items as spare discs, pen, paper, reference manuals, etc. Follow the trend with Watford plinth. (Turn to the 6th page of our advert for the Plinths).
P.S. All our 5¼" Disc Drives with PSU are compatible with the Compact Micro. All you require is the special Compact Disc Drive Cables designed by us.



Capacity	Drives without P.S.U.		Drives with P.S.U.	
	Single	Twin	Single	Twin
200K (360K)	CLS 200 £90		CS 200 £102	
400K (720K)	CLS400S £92	CLD 400 £175	CS 400S £103	CD400 £196
800K (1.44M)		CLD 800S £179		CD 800S £198

● TWIN Disc Drive Case, complete with Power Supply & Cables **£43**
Securicor carriage on Disc Drives £5 to £6

Prefix ***C*** *= Cased Drive*
L *= Less PSU*
S *= Single*
D *= Double*

Suffix ***S*** *= 40-80 Switchable*

e.g. CLS400S = Cased Disc Drive, Less power supply unit, single 5¼" 400K, (720K in double density); Double sided; 40/80 track switchable.

Cable to connect 5¼" Disc Drives to BBC Compact
Single £9 Twin £12
Special Cable to connect both 3½" and 5¼" Disc Drives simultaneously to the BBC Compact £13

3M – DISKETTES

3M – SCOTCH Diskettes with Lifetime warranty from Watford Electronics your 3M Appointed Distributor.

- *10 × 5¼" S/S D/D 40 Track Diskettes* ***£9***
- *10 × 5¼" D/S D/D 40 Track Diskettes* ***£11***
- *10 × 5¼" S/S D/D 80 Track Diskettes* ***£13***
- *10 × 5¼" D/S D/D 80 Track Diskettes* ***£13***
- *10 × 5¼" 1.6M D/S D/D High Density Discs for IBM XT and AT* ***£28***
- *10 × 3½" S/S D/D 40/80 track Discs* ***£18***
- *10 × 3½" D/D D/D 40/80 track Discs* ***£22***

TOP QUALITY 3½" & 5¼" DISKETTES

To complement the range of quality discs and disc drives that WE already sell, WE are now supplying some special offer packs of 10 high quality discs. Each Disc has a reinforced hub ring and carries a lifetime guarantee. These are supplied complete with selfstick labels and packaged in an attractive plastic library disc box to protect them from damage. We strongly recommend these Discs.

DON'T SETTLE FOR LESS, BUY THE BEST

- *10 × **M3** 3½" D/S D/D 80 Track Discs* ***£18***
- *10 × **M4** 5¼" S/S D/D 40 Track Discs* ***£7***
- *10 × **M5** 5¼" D/S D/D 40 Track Discs* ***£9***
- *10 × **M7** 5¼" D/S D/D 80 Track Discs* ***£11***
- *3" Double Sided Discs* ***£3 each***

Special BULK OFFER on 5¼" DISCS

PRICES SLASHED

(Supplied packed in Anti-Static Lockable Storage Units)
(Lifetime warranty on Discs)

BULK PACK DISCS in lots of 100

Type	S-S 40T	D-S 40T	D-S 80T
● Without Sleeves	£35	£39	£45
● With Sleeves	£38	£42	£48

ACORN WINCHESTER DRIVES

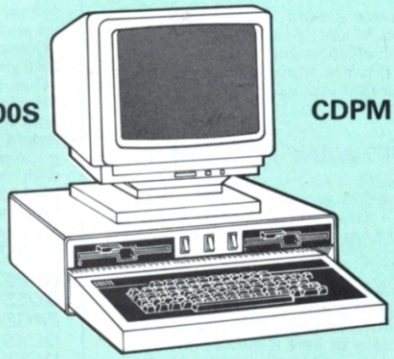
Supplied complete with Level 3 Econet File Server software.
20 Megabytes **£699; 30 Megabytes £1549**

PRICES SLASHED

WATFORD's WINCHESTER DRIVES

- 10 Megabyte Unit with ADFS **£399**
- 20 Megabyte Unit with ADFS **£499**
- 40 Megabyte Unit with ADFS **£999**

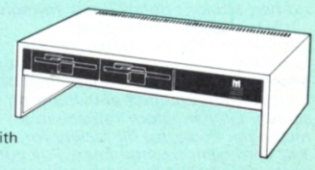
CDP 800S **CDPM 800S**



Twin 800K Double sided 40-80 track switchable disc drives mounted in an attractively finished Beige colour plinth for the BBC Micro. Supplied complete with integral power supply, cables and Utilities disc. The switches are mounted on the front panel for ease of use.

CDP 800S for BBC Micro £119 **CDPM 800S for Master £205**
(Securicor Carr. £7)

ACORN'S Twin 800K Disc Drives



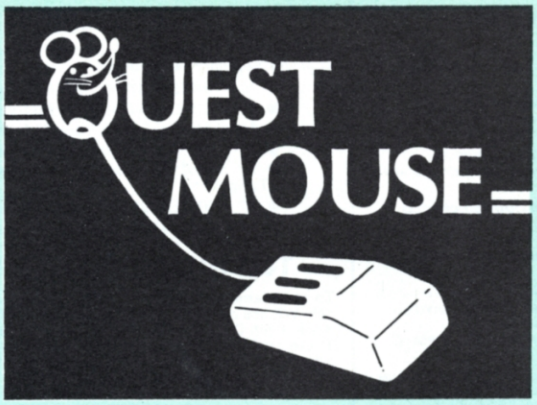
Specially mounted side by side in a Master Plinth. Supplied complete with Cables. Plugs directly to the Master Computer.

RRP ~~£250~~ **Our Price: Only £189** (carr £7)

NOMINATED FOR

BRITISH MICRO COMPUTING AWARDS 1987

QUEST MOUSE



QUEST MOUSE

The ultimate in Mouse technology, the Watford Electronics Quest Mouse must be the most powerful Mouse package yet produced for the BBC Micro. Featuring state of the art 32K ROM software the Quest Mouse package is filled with features essential to the budding artist. The Quest Mouse is a high precision, low profile and large footprint mouse. It has three large comfortable buttons and is smooth and easy to use on most work surfaces. The Quest Mouse is FULLY HARDWARE COMPATIBLE with the AMX MOUSE so that programs such as AMX Pagemaker etc, will work with it.

The two parts of the Quest package are available separately so that existing Mouse owners can upgrade to the Watford's sophisticated Quest Paint software or replace their existing worn out mice for a minimum cost.

QUEST PAINT

The Quest Mouse software is supplied on a PALPROM unit to allow the sophisticated 32K program to be used from a single ROM socket. It is compatible with the BBC B, BBC B Plus and BBC Master Series machines.

The software is used to draw high resolution Mode 1 pictures in full colour. All menu selection and control of the drawing process is performed with the mouse so that you will hardly ever touch the keyboard.

SOFTWARE FEATURES

The software is far too powerful for us to describe it fully in such a small space. Below is a list of the various features. Please write to us for a fully descriptive leaflet.

Disk interface not required. Utilities disk has facility to create and print big screens. Colours applied can be solid, either pattern of user defined pattern. Drawing can use brush or airbrush. Brush shapes can be defined and stored. Airbrush sprays colour/pattern randomly with four jet sizes and even or center spread. Colour cycles. Colour protection to stop particular colours from being overwritten by selected drawing actions. All standard drawing facilities like: rubber, straight pencil lines, triangles, circles, ellipses, rectangles, parallelograms, polygons, etc are provided. All shapes can be solid or just a boundary line. Once a shape has been set up it can be repeated anywhere on the screen. Global colour replace in a rectangle. Powerful fill facility for areas and vertical/horizontal lines. Full cut and paste of rectangular areas with rotation and size with screens from Watford Beeb Video digitiser. Load and Save screens with colour pallet information, save brush and pattern definitions etc.

Take The Guesswork Out of Selecting a Mouse Package
With reviews like this how can you go wrong.

Popular Computing Weekly, 9-11 June '87
"What you actually get for your money is a well built, three button mouse (far superior to the AMX mouse)."
"Overall the combination of a quality mouse and decent art package gives Watford Electronics a real chance of supplanting AMX as mouse supremos."

Micro User June '87
"Quest Mouse and Quest Paint can hold their heads high in the market. . ."

A&B Computing June '87
". . . Watford Electronics, a company famed for excellent hardware add ons and versatile software packages. Called Quest mouse, "this is a very special mouse driven drawing package. . ."

". . . you will have one of the most comfortable and professionally built mice I have used in a long time. The buttons are responsive, the mouse movement is smooth and without directional bias – a pleasure to use."

"What we have here is probably the best art package there is for the BBC Micro . . ."
"Quest Paint is a major leap forward in BBC programming. . ."
"Quest Paint is an original piece of programming, it is friendly and well endowed with many useful facilities. I would comfortably say it is easier to draw good pictures with Quest Paint than it is with more expensive 'Professional' art packages for the Atari ST and the Commodore Amiga. A recommended buy if you are looking for the best in BBC micro based art packages".

QUEST MOUSE & QUEST PAINT	***£55***
QUEST MOUSE, QUEST PAINT, AMX PAGEMAKER & PAGEFONT	***£85***
QUEST MOUSE ONLY	***£29***
QUEST PAINT SOFTWARE	***£32***
QUEST FONT DISC	***£12***
QUEST MAT	***£3***
Part-exchange your old Mouse for a New QUEST MOUSE for only	***£23***

N.B.
1. Quest Paint supplied complete with Software in a 32K ROM, Comprehensive User Guide and a Utility Disc.
2. Quest Font Disc has 24 text FONTS for use within Quest Mouse.
P.S. There is no need to worry about any of your existing AMX mouse software. The Quest Mouse is totally AMX compatible so it will work with any of the AMX range of software.

All prices in this advert are exclusive of VAT.

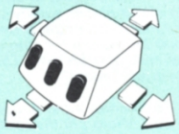
MARK II LIGHT PEN + PENPAL 2

Our Mark II Light Pen is the very latest in light pen technology. It is totally insensitive to local lighting conditions and works with many different monitors. The pen only responds to the High Frequency light produced by your monitor/TV. An LED indicates when valid video data is being produced. A conveniently located switch is also fitted.
Penpal II, Watford Electronics' sophisticated light pen software is also supplied free on cassette or disc (please specify). This is a highly sophisticated drawing package enabling you to gain the maximum benefit from your Light Pen. The software is used to edit Mode 2 full colour screens using lines, patterns and you own designs. Screens may be saved to cassette or disc.

Price Only £18

CREDIT CARD 24 HOUR
Ansaphone Hot Lines
(0923) 50234 or 33383

THE AMX MOUSE



Now supplied with the NEW SUPERART Software ROM & Disc at no extra cost.

ONLY: £59 (carr £1.50)
(Please specify for BBC or Master Computer)

We are giving away, absolutely **FREE,** our popular Colour Art software package worth **£15** with every AMX Mouse package purchased from us.

AMX MAT	**£3**
AMX MOUSE ONLY	**£29**
AMX DESK Package	**£19.00**
AMX UTILITY Package	**£11.00**
AMX SUPERART Package	**£39**

AMX PAGE-MAKER Pack – A desk--top publishing software. It Works with keyboard, joystick and a mouse **Only: £32**

We are giving away, absolutely FREE, PAGE-FONTS, a disc containing over 20 fonts, with every purchase of AMX PAGE-MAKER from us.

PAGE-FONTS Over 20 fonts for use with AMX PAGE-MAKER	**£9.50**
EXTRA EXTRA	**£19**
AMX DESIGN (ROM)	**£59**
AMX 3D ZICON Disc	**£19**
AMX Database Disc	**£19**
AMX XAM Educational	**£19**
AMX MAX A gem of desktop (ROM)	**£17**

RB2 MARCONI TRACKER BALL

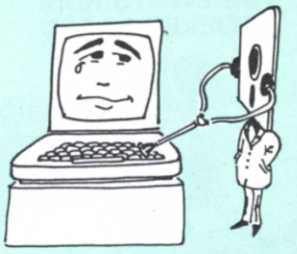
Complete with Software Disc	**£59**
RB2 + Software Disc + Quest Paint	**£85**

FLEET STREET EDITOR

Software pack **£35**

Admin Xtra Disc Utility	**£13**
Walt Disney Disc Utility	**£13**
Fonts N Graphics Disc Utility	**£13**

DIAGNOSTICS DISC



The BBC Micro is a very complex machine and thus diagnosing a fault can be very difficult. At Watford Electronics, we realise how difficult it can be when faced with a problem, finding yourself a long way from your nearest dealer, or even just uncertain about your Beeb's health, but not wanting to waste time and money taking it to be looked at.
The solution to these problems is here now, in the form of the Watford's Diagnostics Disc. This excellent utility is specially designed to test out the following areas of your Beeb:
RAMs, ROMs, ULAs, Sound, Keyboard, Disc, RS423, ADC, User Port, Printer Port, Cassette, Joysticks, Speech, Disc Drives, 6502 and Z80 2nd Processors.
This utility is an invaluable aid for all those who take the reliability of their system seriously. A comprehensive manual provides full operating details and a list of possible causes and remedies for any faults that you may find along the way. The package also enables a permanent equipment and service record to be maintained.

Only £20.00

BBC SOFTWARE'S Popular Educational Software

- Maths with a Story 1 (Cassette). 4 primary level maths programs **£9.95**
- Maths with a Story 2 (Cassette) 4 further maths programs **£9.95**
- Picture Craft (Disc) 6 - 14 age group. Pack consists of flexible geometrical design & colouring programs **£19.95**
- WAVES: Science Topics (Disc) CSC O Level Physics program. **£14.95**
- RELATIONSHIP: Science (Disc) O Level Biology program. **£14.95**
- BONDING: Science (Disc) O Level Chemistry program. **£14.95**
- ELECTROMAGNETIC SPECTRUM (8 Discs) O Level program. **£14.95**
- ELECTRONICS IN ACTION (Disc) O Level program **£14.95**
- NEWTON & THE SPACE SHUTTLE (Disc) O Level program. **£20**
- ECOLOGY (Disc) O Level program. **£20**
- POLYMERS (Disc) O Level program. **£20**
- Clasification & Periodic Table O Level. The suite is supplied with its own database of chemical elements which can be classified according to your own rule. **£20**
- FOOD & POPULATION (Disc) O Level program. **£20**
- MICROTECHNOLOGY (Cassette) O Level program. **£6.95**
- A VOUS LA FRANCE (2 Cassettes) A French language home study aid. **£17**
- DEUTSCH DIREKT! (Disc & Audio Cassette) **£20**
- Modem Master (Disc) **£11.25**
- ADVANCED TELETEXT SYSTEM **£6.90**
- PERIOD TABLE SOFTWARE **£20**
- USING YOUR COMPUTER (Cassette) 8-12 age **£24**

TED

THE ULTIMATE TELETEXT SYSTEM

TED is one of a new generation of powerful 32K ROMs for the BBC B, B+ and Master computers and is compatible with disc, tape and network systems. It is in everyday use in schools, colleges and universities, Programmers, Prestel I.P.'s, Micronetters and exhibitors have also found it indispensable.

TED includes the most comprehensive teletext (Mode 7) screen editor ever written for the BBC micro, combining flexibility with ease of use. Its sophisticated facilities include line, column and block copying within AND between frames; text, in a variety ofstyles and sizes, entered directly from the keyboard; graphics and line drawing modes; search and replace; margins; printer dump routines and a library of in-built icons and typefaces. TED will edit ANY mode 7 screen and can even convert high-res graphics screens to mode 7! Included within the ROM is a fully Epson compatable mODE 7 graphics dump routine giving a grey scale printout of exactly what appears on the screen.

Using '*SHOW' (a versatile carousel), collections of mode 7 screens may be 'routed' or displayed sequencially, making it ideal for creating andrunning 'Viewdata' information systems. Over 1200 frames may bestored on a twin 80 track drive. A unique feture of TED is '*SCROLL', which lets you create pages of up to 600 lines which may be viewed 'Wordwise style', automatically or manually. SHOWs and SCROLLs may be freely mixed and even used from within a BASIC program.

The package comprises a 32K ROM, a 117 page manual, a function-key strip and a demonstration disc containing examples of real-time animation and a sample 55-frame database. A stand-alone machine code routine is provided allowing SHOWs and SCROLLs to be displayed on machines not fitted with TED.

Price: £35

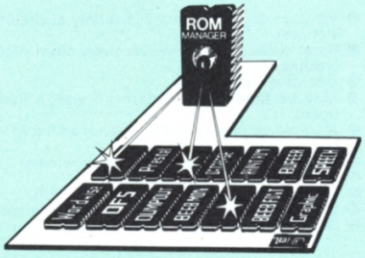
ROM-SPELL

Probably the most advanced and fastest spelling checker available for the BBC Micro. Compatible with View, Wordwise and Wordwise Plus ROMSPELL is simple to use with easy editing of incorrect words. Full facilities for editing the user dictionary to allow customisation to your personal needs. Dictionary includes over 30,000 words and is supplied with a Comprehensive manual.

NOT compatible with 1770 DFS.
(Please state 40 or 80 track disc)

Price still only: £25

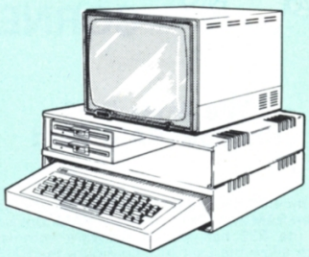
ROM MANAGER



Take control of your Sideways ROMs with ROM Manager. This powerful utility ROM gives you power over your sideways ROMs. Disable whole ROMs, send commands directly to named ROMs and many other powerful facilities.
"Provides comprehensive management of all your installed ROMs". (BEEBUG November '84.)

ONLY £20

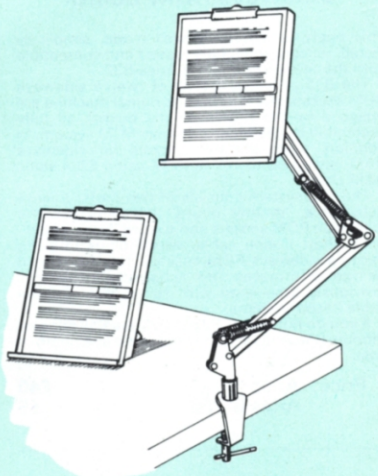
PLINTHS FOR BBC MICRO, MASTER & PRINTERS



Protect your computer from the weight and heat of your monitor. The BBC micro plinths have slots for maximum ventilation. The single plinth is suitable for a BBC and monitor, whilst the double height version provides enough room for our stacked or side-by-side dual disc drives or TORCH Disc pack, to be placed in the centre section. If you use our stacked drives, the remaining space can be used for further peripherals e.g. Speech Synthesizer, EPROM programmer or simply stationery. The computer slides neatly in to the lower section allowing easy access to remove the lid. The printer plinth is equally sturdy but without the cooling slots. It allows for access to the paper from the front as well as from the rear, (a facility not often thought of in similar products) if the paper is located beneath the plinth. This is a very convenient way to work especially if your work area is not deep enough to take the printer and paper separately.

SINGLE BBC PLINTH	**£11** (carr. £1.50)
DOUBLE BBC PLINTH	**£20** (carr. £2.00)
PRINTER PLINTH	**£10** (carr. £1.50)
SINGLE MASTER PLINTH	**£14** (carr £1.50)
DOUBLE MASTER PLINTH	**£25** (carr £2.00)

COPY HOLDERS



How often have you been about to type hand written notes into your computer when you find that there's nowhere to rest the paper or that your notes are resting at the wrong angle to read the type? Whether the notes be your latest program or the draft of a new trilogy, the new Manuscript Holders from Watford are superb for holding your paper at the ideal height and angle to allow you read and type in ease and comfort.

Available in 2 versions, desk resting and shelf clamping versions, these two units hold your paper firmly by means of a plastic retaining ruler and a clip grip. Both units are full A4 size.

Amazing value at only
Desk Top **£10** (carr. £2)

Angle poise **£14** (carr. £3)

Continued

ARIES CORNER

The Aries B-32 Shadow RAM Card

Like the BBC B+, the B32 provides 20k of shadow screen RAM and 12k of sideways RAM. Unlike the B+, the B32 has simple software commands which allow the user to reconfigure the RAM as 16k of shadow RAM and 16k of sideways RAM, or all 32k as sideways RAM.

With the B32, the programmer gets up to 28k of RAM available for Basic, Logo, Comal, Forth, Lisp and BCPL programs in any screen mode. The business user gets extra memory for View, ViewSheet, Wordwise Plus, Interword and many other applications. For advanced applications, the scientific user gets access to a massive 47k of data storage using the Acorn approved *FX call.

Sideways RAM enables you to load sideways ROM images from disc, allowing you to have a large library of sideways ROMs (subject to the copyright holder's permission) stored on disc. The B32's sideways RAM can also be used to extend any operating system buffer (such as the printer buffer) or to load tape programs into a disc system.

The B32 simply plugs into the 6502 processor socket on your BBC micro – no flying leads to connect and no soldering. Provision of the on-board ROM socket means that the Aries-B32 control ROM does not use up one of your existing ROM sockets.

Price: **£80** (carr. £2(

Aries B-12 Sideways ROM Board

This board is extremely well made, simple to install, reliable when fully loaded and compatible with the Aries-B20 and the Aries-B32

The B12 provides a total of twelve sideways ROM sockets (the four in the original machine are replaced by the twelve on the board), all fully accessible by the MOS sideways ROM system. In addition, there are two sockets for sideways RAM, giving up to 16k of RAM using 6264 static RAM chips.

The B12 system consists of two parts: a large detachable "mother board" which carries the extension ROM sockets and a small "base board" on a short ribbon cable, which plugs into the existing sideways ROM sockets. This two-board design eliminates the reliability problems previously associated with some other ribbon-cable based systems.

If you do not have a B32 or B20, a small adaptor module (the Aries-B12C) is available at a nominal cost.

Price:	Aries B-12	**£40**
	Aries B-12C	**£5**

ARIES B-488 IEEE-488 INTERFACE UNIT

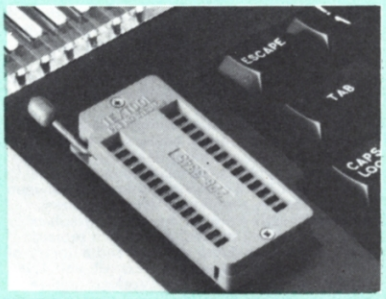
The Aries-B488 is an interface unit to enable the BBC micro to control and monitor IEEE-488 bus systems. The IEEE-488 bus (also known as the 'GPIB' or 'HP-IB') is the standard method of interconnecting programmable laboratory instruments and control equipment. Using the B488, up to 15 devices may be connected in a single high-speed data network.

£238 (Carr £3)

GRAPH PAD 2

Supplied complete with Software
£60 (Carr. £3)

SIDEWAYS ZIF SOCKET



Allows you to change your ROMs quickly and efficiently, without opening the lid. The ZERO INSERTION FORCE (ZIF) socket is located into the ROM Cartridge's position.

- Very simple to install. NO SOLDERING required. The ZIF (Zero Insertion Force) eliminates the possibility of damage to your ROM pins when inserting & extracting.
- The low profile of the socket allows unrestricted access to the Keyboard.
- All data and address lines are correctly terminated to ensure correct operation of suitable ROMs with the BBC micro. We also supply a purpose designed see-through storage container with anti-static lining, allowing you to store up to 12 ROMs, protecting them from mechanical and static damage.
- This versatile hardware solves the problem of running out of socket space. Simply lift the ROM from the ZIF & insert a different one (No pulling or pushing of Cartridges. It is a must for all professionals and Hobbyists alike.)
- BBC, B+ and Master compatible.

ONLY **£15** (carr £2)

Low Profile CARTRIDGE SYSTEM

Complete System consists of: Low profile ROM Cartridge, Socket housing, Cable assembly, 5 labels and a library storage rack.

● Complete System	**£11**
● Spare Cartridges	**£2.50**
● Spare Rack	**£1.50**

16K Sideways RAM Modules

Complete with such features as read and write protection, these new modules from Watford Electronics are ideal for the hobbyist, software developer and ROM collector.
Key points to note about this new addition to the Watford range of products are:

- Write protection (useful in a variety of circumstances).
- Read protection (allows recovery from ROM crashes).
- Compact construction.
- May be fitted in systems even with a ROM board.
- Multiple units may be fitted, even with a ROM board.
- No overheating or overloading problems.
- Free utilities disc supplied.
- Can be used as a 16K PRINTER BUFFER.
- Ideal for professional software development.
- Supplied with utilities software disc.

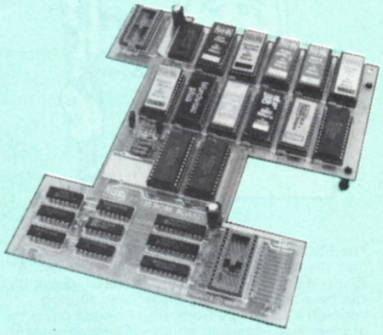
Only: **£24** (carr £2)

Optional extras

READ and WRITE protect Switches **£2** each
Battery for Battery Backup **£3**

All prices in this advert are exclusive of VAT.

SOLDERLESS SIDEWAYS ROM SOCKET BOARD



In the May 1986 Micro User's independent review, the writer concludes, "The board has been well laid out. Its position is much better than others – not over the HOT RAM chips and further away from the disc controller area". "I give the solderless ROM board the thumbs up and wish it success".

This brand new board from Watford Electronics is designed specifically for those wishing to add a ROM board to their own BBC without the need to perform any soldering.

This new board expands the total possible number of ROMs in a BBC from 4 to 16.

Unlike our competitors inferior boards, the ONLY upgrade required for fitting battery backup to the Watford Solderless ROM board (all Watford ROM boards, actually) is the fitting of the battery itself. (No other expensive components are required.)

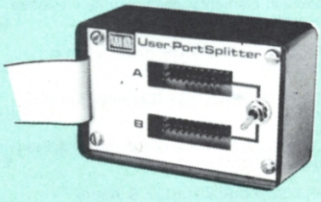
- The key features of this new, no fuss, easy to install quality product from BBC leaders Watford Electronics are as follows:
- Increase your BBCs capacity for ROMs from 4 to 16.
- **No soldering required.**
- Very low power consumption.
- Minimal space required.
- Compatible with Torch, DDFS, RAM Card, 2nd Processor, etc.
- Socket 14 takes two 6264 RAM chips.
- Read protect to make RAM "Vanish") allows recovery from ROM crashes.
- Battery backup option for RAM chips.
- Supplied ready to fit with comprehensive instructions.

Price: Only £32
Battery backup fitted **£36**
(carriage £2)

- Sideways RAM Utilities Disc for Solderless ROM Board. Includes the options to load and save ROM Images and the facility to use Sideways RAM as Printer Buffer.

Only: £8

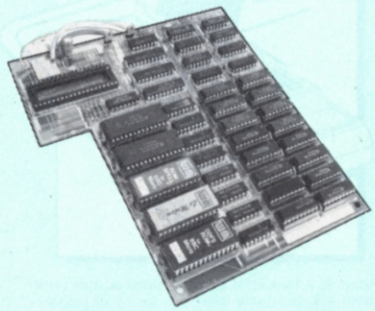
USER PORT SPLITTER UNIT



Gone are the days when you had to plug and unplug devices from the User Port. This extremely useful little device allows two units to be connected to the User Port simultaniously, and select between them simply by toggling a switch. This device is particularly useful for those people using Quest Mouse and the Watford Video Digitiser or any similar combination.

Excellent Value at **£15**

ROM/RAM CARD



Watford Electronics announced the first ever commercial ROM board for the BBC micro, the Watford Electronics 13 ROM Socket Board 3 years ago. Following the success of this board, we have designed what probably represents the ultimate in expansion boards, the new Watford Electronics ROM/RAM board. This highly versatile and sophisticated board represents the latest in "2nd generation" sideways ROM technology for the BBC micro, designed to satisfy the serious BBC user.

- NO SOLDERING required to fit the board.
- NO overheating problems.
- No User Port corruption (avoids problems with the mouse, modems, Eprom Programmers, etc.)
- Fully buffered for peace of mind.
- Firm mounting in BBC micro.
- Compatible with all BBC micros (not BBC+ or Master).
- Total number of ROMs increased from 4 to 8.
- Up to 8 banks of sideways RAM (dynamic).
- Option for 16k of Battery backed CMOS RAM (CMOS RAM needs one ROM socket).
- Software Write protect for ALL RAM.
- Read protect for CMOS RAM (ALLEVIATES crashes during ROM development).
- Separate RAM write register (&FF30 to &FF3F).
- Automatic write to currently selected RAM socket for convenience.
- Accepts any ROM.
- FREE utilities disc packed with software.
- Compatible with our DDFS board, 32k RAM Card, Delta Card, sideways ZIF, etc.
- Large printer buffer.
- UNIQUE Fully implemented RAM FILING SYSTEM (similar to the popular Watford DFS).
- ROM to RAM load and save facilities.

The SFS (Silicon Filing System) can utilise up to the full 128k of RAM (with the SFS in any paged RAM) as a SILICON DISC. This behaves as a disc drive, with all the normal Watford DFS features (including OSWORD &7F for ROM-SPELL, etc.) to provide an environment that looks like a disc but loads and saves MUCH faster.

The ROM-RAM Board plugs into the 6502 CPU socket. This leaves free all the existing ROM sockets, which can still be used normally.

Any ROM that can be plugged into the BBC micro's own ROM sockets may be used in the ROM-RAM Board.

The ROM-RAM Board is supplied with all ordered options fitted as standard. Upgrade kits (with full instructions) are available for all of the options, for later.

Please write in for further details.

INTRODUCTORY PRICES:

- *ROM/RAM card with 32k dynamic RAM* ***£39***
- ROM/RAM card with 64k dynamic RAM ***£52***
- ROM/RAM card with a massive 128k dynamic RAM **£80**

(carriage on ROM-RAM Card £3)

OPTIONAL EXTRAS:

- *16k plug-in Static RAM kit* ***£6***
- *16k Dynamic RAM for Upgrade* ***£7.50***
- *Battery backup* ***£3***
- *Read and Write protect switches* ..... ***£2 each***

Complete ROM-RAM board
All options installed ***£89***

P.S.
Is your existing ROM Board overflowing with ROMs? Do you need more Sideways RAM? Is your Board unreliable? Then upgrade to Watford ROM/RAM Board and pay £10 less

Le Modem

The MODEM from Watford

At last a professional MODEM for the BBC Micro. Unlike other 'Modem packages' this is a complete package there are no extra software costs to get 'up and running'. Of course Le MODEM is multi-standard, i.e. 300/300, 1200/75 & 75/1200 UK and BELL (USA) are all supported.

The features that make Le MODEM such good value are:

- *A complete communications terminal that transforms your BBC Micro into a very powerful World-wide data transfer system.*
- *Auto Dials, Auto answers, and is completely controlled by your micro. There are no external controls!*
- *Allows you to access PRESTEL, B.T. GOLD, THE SOURCE, MICROLINK, MICRONET, MICROWEB, THE TIMES NETWORK, MICRO LIVE (BBC TV database), CITY BB and more.*
- *Designed to be SIMPLE but SOPHISTICATED. To LOGON to a data base all you have to know is its TELEPHONE NUMBER, Le MODEM does the rest.*
- *Supplied with a comprehensive telecomms package in a 16K sideways ROM which includes a FULL PRESTEL terminal allowing TELE-SOFTWARE to be downloaded.*
- *A comprehensive 80 column terminal. This includes XMODEM error checked transfer protocol, to allow error free data transfer anywhere in the world!*
- *FULLY controlled by simple '*COMMANDS allowing you to control it from your own BASIC programs. To get you started we supply a FREE disc of bundled software!*
- *Connects to the 1MHz bus. A *AUDIO ON-OFF command allows you to actually hear the telephone line through your BBC micro loudspeaker.*
- *Completely self contained with internal mains power supply. (Even a free mains plug is fitted!) A *TEST facility gives ON SCREEN indication that Le MODEM is working correctly.*
- *Packaged in such as way that you need nothing else except a BBC Micro to communicate with computers all over the world.*
- ***FREE Registration to MicroLink.***
- *BT Approval applied for.*

(When ordering, please specify the version required, (BBC or Master)

SPECIAL OFFER

Price: **£74**
(carr £3)

(Price includes, Le Modem, Software ROM, Cables & Comprehensive Manual)
(Write in for further details)

Nightingale Modem

SPECIAL PRICE to our Customers

£82

(Price includes: Nightingale Modem, Commstar ROM pack & Comprehensive manual)

Nightingale Modem without software **Only £75**
COMMSTAR ROM package only **£29**
(P&P on modem £3.00)

APOLLO

The NEW Modem from Watford

Following numerous requests from you, our discerning customers for an APPROVED, Low Cost & High Performance modem with Auto Dial & Auto Answer facilities as standard) we bring you the versatile APOLLO Modem. Just compare the features and look at the price (which incidentally includes the cost of the Software, manual and BBC connecting cable). We are sure you will agree that Watford Electronics in their traditional way are giving you a super 'value for money' deal.

Just look at these features:

- V21 for Bulletin boards, Microlink, Telecom Gold, etc.
- V23 for Prestel, Home Banking, and other Viewdata services.
- Reverse V23 allows User run Viewdata service.
- 1200-1200 half duplex for communications.
- XMODEM, HEX and ASCII file transmission.
- Auto Dial of given 'phone number.
- Auto Answer for User's Bulletin Board.
- 80 column terminal with split screen facility.
- Prestel text screen dump.
- Fully BABT approved.
- **FREE Registration to MicroLink.**

The Apollo is attractively finished in matt black. It opens the doors to world communication to both, the Hobbyist and the Professionals alike. With baud rates varying from 300/300 Originate and Answer, 1200/75 and 75/1200 full duplex and 1200/1200 half duplex, virtually all the popular tele-services can be accessed. A comprehensive Comms ROM oversees the use of the APOLLO, providing simple commands for all the software controlled facilities. APOLLO is an ideal modem for both the first time buyer and the seasoned user. Join the Telecommunications Revolution – Buy a Watford APOLLO!

Only: **£75** **(Carr £3)**
(Write in for full specification)

Minerva Systems Software

System Delta with Card Index	**£55**
System Programmers Ref. Guide	**£19**
System Gamma	**£43**
System Gamma Prog, Ref, Guide	**£19**
System Mailshot	**£17**
System Reporter	**£17**
System Intrer/View Link	**£17**

Versatile BEEB SPEECH SYNTHESISER Unit

The Watford Speech Synthesiser is a very flexible speech synthesis unit based upon the powerful phonemes system. This system stores the building blocks of speech (called phonemes) and allows you to combine them quickly and easily to form virtually any word imaginable.

Supplied with an advanced ROM, you are provided with a 500 word dictionary to get you started. These can easily be added to by following the notes given in the comprehensive manual.

SPECIAL PRICE £32 (carr £2)

Continued →

COMPUTER CONCEPT'S ROMS

ACCELERATOR	£48
CARETAKER Basic Utility	£25
DISC DOCTOR	£28
Graphics ROM	£23
TERMI	£25
COMMUNICATOR	£49
SPEECH ROM	£24
Printmaster	£24

Wordwise £24

Wordwise plus

WORDWISE PLUS £40

We are giving away absolutely **FREE,** the superb Word-Aid ROM worth £24, with every WORDWISE PLUS package bought from us.

Word-Aid

The most comprehensive utilities ROM for Wordwise-Plus

Extend the power of your Wordwise Plus word processor with this most advanced ROM from Watford. By utilising the powerful Wordwise Plus programming language, WordAid provides a whole host of extra features, all accessed via a special new menu option. This ROM has been personally approved by Mr Charles Moir, the author of WORDWISE PLUS.

- Alphabetical sorting of names and addresses.
- Text transfer options.
- Chapter marker.
- Epson printer codes function key option.
- Search and display in preview mode.
- Embedded command removal.
- Print Multiple copies of a document.
- Multiple file options for print and preview.
- Address finder.
- Label printer.
- Mail-merger.
- Number/delete/renumber.
- Clear text-segment area.
- BBC B, B+ and Master compatible.

Only **£24**

(N.B. Word Aid requires a Disc Interface in your Micro)

HI-WORDWISE-PLUS DISC: £5

SPELL MASTER £47

Inter SHEET ONLY £37

INTER-CHART ONLY: £26

Inter-WORD

Only: **£39**

INTERBASE £55

All Prices Exclusive of VAT

VIEW

VIEW WORDPROCESSOR 2.1	£37
VIEW 3.0 ROM	**£54**
VIEW PROFESSIONAL	**£79**
HI-VIEW (for use with 6502 2nd Processor)	**£36**
VIEW Printer Driver Generator (Please specify Disc or Cassette)	**£9**
VIEWSHEET (Acornsoft)	**£37**
VIEWSTORE	**£37**
VIEWSPELL with 80 track disc	**£29**
VIEWPLOT Disc (Please specify for Master 128 or Compact)	**£22**
VIEW-INDEX	**£12**
OVERVIEW Packs 1 & 2 for the Master	**£75**

Watford's own Sophisticated VIEW PRINTER DRIVERS

Epson FX80 & Kaga KP (Disc)	£8
Juki & Brother HR15 (Disc)	£8
Silver Reed Printers (Disc)	£8

Micros in Business (Disc)
An introduction to Business software for the BBC Micro from Acorn **£43**

ADVANCE COMPUTER PRODUCTS' ROMs

Adv. Disc Toolkit	£29
Adv 1770 DFS for Mast/Compact	£29
Adv 1770 DFS for BBC/BBC+	£29
Adv Disc Investigator	£24
Adv. Control Panel	£29
Adv. Rom Manager	£13

MINI OFFICE II

Disc Version	£14.50
ROM Version	£48.00

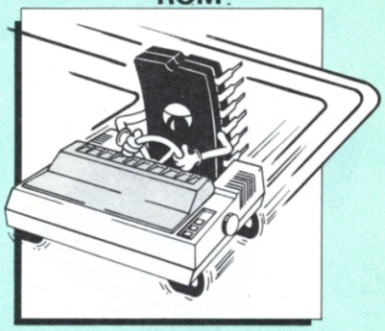
REPLICA 3

This new improved REPLICA 3 from Clares is a very powerful disc based TAPE to DISC Utility. It now transfers even more programs than ever before. Replica 3 will not work with all programs but then neither will anything else. 30,000 Replicas have been sold to date. It has to be good.

£13 (40 or 80 track)

Acorn's Speech Synthesiser package, complete
Special Offer £18

VIEW PRINTER DRIVER ROM



View is a powerful word processor, but until now has seriously lacked in terms of printer support. With the launch of our Printer Driver ROM, which includes an extremely powerful and easy to use Printer Driver Generator, View users can find themselves in the realms of advanced word processing only at a small outlay.

The VPD extends View's printer command with a series of mnemonic commands. All standard highlight sequences are also supported. A large range of printers are supported by drivers contained within the ROM (the drivers can be downloaded and customised). Printers supported include: Epson's MX, RX, FX, FX, LX, JX80 range, HI80, KP810/910, PW1080, JP101, HR15, M1009, GLP, JUKI 6100, etc.

Other printers are readily supported by defining a Printer Driver using the built in Printer Driver Generator. The features mentioned below are available to both the built in Printer Drivers and user defined drivers (assuming the printer supports the features).

NLQ control, Underline, Bold, Proportional Spacing, Microspacing, Italic, Superscript, Subscript, Condensed, Enlarged, Double Strike, Set lines per inch numerically (e.g. LPI 6), Set characters per inch numerically (e.g. CPI 5), Select printer font, Select printer ribbon colour, Translation sequences, Emulation of BBC Character Set, Simple numeric expressions for certain operations, Full printer setup, Send control codes, Print prompt on screen, Redefinable Pad character, Pause for key press, Prompt to change daisywheel, and Execute * command when printing.

Other features include a very powerful on screen preview, with bold, italic, underline, super/subscript, enlarged highlights, and a special printer driver to allow memory based text to be previewed by View 1.4. Of course, View 1.4, 2.1 and 3.0 are all supported, as is Shadow RAM and 6502 Second Processors. The BBC B series and Master series of micros are supported. A comprehensive manual is supplied. All in all, a very professional product for the discerning user who wants power at their finger tips. (Write in for a detailed leaflet).

Price: Only £33

Harness the full potential of your Epson RX or FX printer. The NLQ ROM makes Epson printers produce Near Letter Quality output with optional proportional spacing, enlarged and underlined. Accessed by simple * commands from Basic, Wordwise and View (with driver) or almost any other language.

(Send an SAE for sample printout)

Only: £25

VIEW PRINTER DRIVER for NLQ ROM **£7**

DUMPOUT 3

A highly sophisticated screen dump ROM. This has to be the most flexible and powerful screen dump ROM yet produced for the BBC micro. It will put on paper anything you see on the screen, including full Mode 7 graphics. Also provided are window setting utilities and OSWORD calls to plot and read Mode 7 graphics pixels.

Facilities:

- *Vertical and horizontal scaling in all graphics modes and mode 7*
- *Rotation of image by 90, 180 or 270 degrees*
- *Left hand margin setting*
- *Screen dump window setting*
- *Colours appear as grey scale*
- *Two tone fast dump*
- *Colour mask*
- *Mode 7 contrast expansion*
- *Mode 7 contiguous dump*
- *Key triggered and User Port triggered dumps*

The Micro User Feb. 1985.
'Without reservation I wholeheartedly recommend the Dump Out 3 ROM as the ultimate screen dump facility for the BBC Micro . . . it must represent excellent value for money and surely cannot be beaten".

For use with the following printers:

GLP, GP80/100/250, CANNON, STAR, KAGA/TAXAN, NEC, SHINWA CP80, GEMINI, EPSON MX/RX/FX, M1009, NEC PC8023, DMP100/200/400, Panasonic KX1080, Mannesman Tally and compatibles.

Only: £25

(Write in for further details on all above ROMS)

THE EUREKA CARD

(The Unique RAM Expansion System)

The Eureka Card is Watford's latest and most sophisticated RAM expansion system. Using advanced PAL based technology this card is a breakthrough in RAM systems for the BBC micro. The Eureka Card provides the user with around 58K of free memory in Basic, VIEW and WORDWISE PLUS. You also get Shadow RAM from within the active language. No other RAM expansion system can match that!

Load up to 58K long Basic programs. Texts in VIEW and WORDWISE PLUS up to 58K as well. This with absolutely NO loss of speed in accessing your text or program. Eureka consists of a card containing 64K of program memory, two parallel banks of sideways RAM and some extremely complex switching circuitry. This is all controlled by Eureka's highly sofisticated software supplied in ROM. Designed to a very high specification, this board is fully buffered to give reliable operation under virtually any circumstances.

The Eureka board plugs into the 6502 socket and has NO messy flying leads. It is compatible with many other products from Watford, such as our Solderless ROM Board and our ROM/RAM Board. All in all, the Eureka Card is an amazing board. Jump into the age of serious data processing with a Eureka Card! Please write in for further details 'on advantages the Eureka can offer you'.

Introductory price: Only **£89** (carr £3)

(P.S. Eureka is only suitable for a standard model B; it normally replaces any Shadow RAM cards present. Some speed degredation does occur with filing system access. Eureka cannot be used at the same time as a second processor).

BEEBMON

The most powerful machine code monitor for the BBC Micro **£24.**

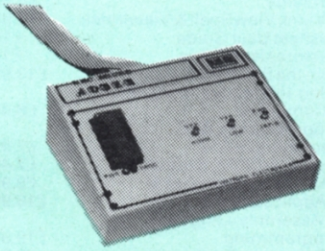
THE NLQ DESIGNER

(The First & still the Best)
Supplied with over 25 Different fonts

A massively useful utility for users of the Taxan/Kaga KP810/910 or the Canon PW1080. This program allows you to define NLQ character sets to download into the printer's memory. Full on screen editing of the font. Requires 6264 RAM chip to be fitted in the printer.
Supplied with disc containing over 25 example fonts. Please specify 40 or 80 track. Fonts are: Italic, Courier, Courier Italic, Script, Copper Plate, Shadow, Bold, Double Print and Gothic etc. (P.S. This ROM is not suitable for Epson printers.)

- *NLQ Designer ROM & FONT Disc* ***£25***

ADDER



Adder is the ultimate EPROM programmer for the BBC Micro. It will program many different EPROMs up to the very latest 27256 32K devices.
The Adder unit connects to the User Port and draws its power from there too. The EPROM is mounted in a top quality ZIF socket. There are no switches or controls as Adder is entirely software controlled.
The Adder software provides sophisticated facilities for programming EPROMs from a RAM image produced by loading disc files. The software is menu driven and designed for ease of use.
Features:

- Two ultra fast programming algorithms or standard slow algorithm.
- Supports standard 21V programming and newer 12.5 volt EPROMs. (Software switched).
- The RAM image to be programmed can be built up in many ways. Sections of image can be loaded separately. Part programming. Read EPROM. Edit data in memory.
- Automatic processing to handle a list of files to program into the EPROM.
- Automatic disc buffering to allow programming of 32K 27256 devices from a 32K file without extra effort.
- Verification gives detailed error list and checksums are maintained. There is also a blank check facility.
- Works with all standard filing systems. Generates header code for RFS ROMs to allow Basic programs etc. to be stored in EPROM. More than one file per ROM permitted.
- Programs the following EPROMs: From 2K to 32K: 2516, 2716, 2532, 2732, 2764, 2764A, 27128, 27128A, 27256 (Both 12.5V and 21V).

£65 (£3 Carr)

TEX EPROM ERASERS

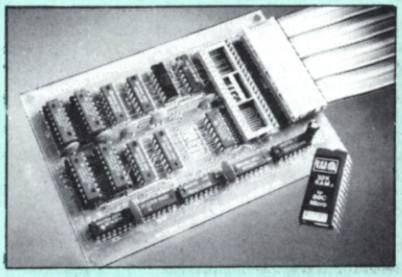
EPROMs need careful treatment if they are to survive their expected lifetime. Over erasure of EPROMs very rapidly turns them into ROMs! The TEX erasers operate following the manufacturers specifications to give the maximum possible working life by not erasing too fast. We use these erasers for all our own erasing work.

- **ERASER EB** – Standard version erases up to 16 chips. **£28** (carr £2)
- **ERASER GT** – Deluxe version erases up to 18 chips. Has automatic safety cut-off to switch off the UV lamp when opened. **£30** (carr £2)
- Spare UV tubes. **£9**

32K

SHADOW RAM-Printer Buffer

Expansion Board



A MUST FOR WORD PROCESSING

Watford Electronics now brings you the latest state-of-the-art MEMORY EXPANSION BOARD for your BBC microcomputer. Don't throw away your BBC B for a BBC B Plus or BBC Master. Just plug the ribbon cable into the 6502 processor socket, and fit the compact board inside the computer. Immediately you will gain not 16K or even 20K, but a massive 32K of extra RAM!!!

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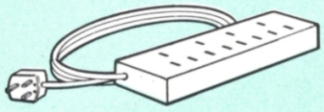

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THE MICRO USER

PROGRAM Library No. 8

Compiled by Steve Turnbull

One point that has come up while compiling this month's Library selection is legality. For example, the Striped Writing routine given here directly pokes system variables, which means that it won't work over the Tube.

Legality is vital to make programs usable on all Acorn machines, so wherever possible please make sure that your submissions to the Library use only documented calls to the MOS.

We have received two decimal-to-roman conversion programs, the one not printed used logarithms in almost every calculation and was considerably slower than the one here.

And we have our first forays into Pascal with a protected key input and sample menu system.

Send your routines – with full details of the language it is written in and the hardware/software requirements – on disc or tape to:

Steve Turnbull, Library, The Micro User, 68 Chester Road, Hazel Grove, Stockport SK7 5NY.

Remember to enclose a stamped addressed envelope for the return of your media. Five blank discs will be sent to the authors of any routines published.

Name: ADFS Total Compact
Language: Basic
Author: Stephen Ashford

The ADFS *COMPACT command does not remove all the gaps between programs – it just links smaller gaps into larger ones. So to completely compact the disc you need to call *COMPACT repeatedly – unfortunately this can take a very long time.

The following program issues a *COMPACT command and then clears the screen before issuing a *MAP command which displays all the gaps. If the vertical position of the cursor is beyond line 2 then there is more than one gap and a new *COMPACT is issued.

The first parameter of *COMPACT is the start page for use as workspace, the second is the number of pages to use. As written the program is set up for a *COMPACT that overwrites the Mode 7 screen. Safer values in a more general situation would be 20 and 5C but it would take slightly longer.

```
10 MODE 7
20 REPEAT
30 *COMPACT 0F 71
40 CLS:*MAP
50 UNTIL VPOS<3
60 *FREE
```

Name: Decimal to Roman Conversion
Language: Basic
Author: Tony Dibble

As challenged, I have written the decimal to roman conversion routine. It works by taking each digit of the decimal number and converting it to the appropriate roman form.

```
100 REM Decimal/Roman Conversion
110 REM ========================
120 READ roman$
130 FOR D%=1 TO 4E6
140 PRINTD%," ",FNdec(D%)
150 NEXT:END
160 DEF FNdec(D%)
170 IF D%>=4E6 PRINT"Too big!":END
180 LOCAL C%,J%,M%,R$
190 M%=1000000:C%=13
200 REPEAT J%=D%DIVM%
210 IF J%=9 R$=R$+FNr(C%,1)+FNr(C%+2,1
) ELSEIF J%>4 R$=R$+FNr(C%+1,1)+FNr(C%,J
%-5) ELSEIF J%=4 R$=R$+FNr(C%,1)+FNr(C%+
1,1) ELSE R$=R$+FNr(C%,J%)
220 D%=D%MODM%:M%=M%DIV10
230 C%=C%-2:UNTIL C%=-1:=R$
240 DEF FNr(D%,N%)
250 =STRING$(N%,MID$(roman$,D%,1))
260 DATA IVXLCDMvxlcdm
```

Get it right!

```
100 =    0 0 | 160 =  288 F | 220 = 6E65 8
110 =    0 0 | 170 =  ED1 E | 230 = B9B3 C
120 = D93B B | 180 = F209 3 | 240 = B945 2
130 = DB73 C | 190 = DF09 8 | 250 = C2F7 8
140 = D8E0 D | 200 = 5F53 2 | 260 =  742 4
150 = F510 3 | 210 = D6F1 5 |
```

Name: Break Message
Language: 6502 Machine code
Author: Andrew Moulden

This program sets up a piece of machine code which is saved so that it can be executed by typing *MSG.

This code then configures your micro so that the message of your choice appears when Break or Ctrl +Break is pressed.

The message can contain any Ascii values and may be up to 255 bytes long and will be terminated by a zero byte. If you want the message to appear as the first message at the top of the screen, change the instruction at line 210 to:

```
BCS out
```

otherwise it will be printed after the initial start up message.

```
100 REM * Break Message *
110 osasci=&FFE3:osbyte=&FFF4
120 code=&900:FOR L%=0 TO 2 STEP 2
130 P%=code:[OPT L%
140 .start
150  LDA #247:LDX #&4C
160  LDY #0:JSR osbyte
170  LDA #248:LDX #routine MOD256
180  LDY #0:JSR osbyte
190  LDA #249:LDX #routine DIV256
200  LDY #0:JMP osbyte
210 .routine BCC out:LDX #0
220 .loop LDA message,X:BEQ out
230  JSR osasci:INX:BNE loop
240 .out RTS:.message
250 ]:$message="Hi there!"
260 P%=P%+LEN$message+1
270 !P%=13:P%=P%+2:NEXT
280 $&700="SAVE MSG 900 "+STR$~P%
290 X%=0:Y%=7:CALL&FFF7
```

Get it right!

```
100 =     0 0 | 170 =   828 B |
110 =   1D8 8 | 180 =   8AA B | 240 = 6E0F 9
120 = D3B6 1 | 190 = 3B5F 2 | 250 = DCEB D
130 = 7CBB A | 200 = A785 7 | 260 = 772C D
140 = 3208 A | 210 = D0FC 1 | 270 = 96DA 0
150 = B75D 4 | 220 = 64B1 4 | 280 = F470 F
160 =   8AA F | 230 = 490F 6 | 290 = A5D2 3
```

Name: Sample Menu
Language: Pascal
Author: John Derry

In response to the request for languages other than Basic and machine code I present this sample menu with a protected input routine similar to the one by Petra Galloway.

The *inchar* function calls the *osrdch* operating system call to read one character which is then checked to see if it is lower case. When it is, it is converted to upper case.

The REPEAT...UNTIL loop in the main program displays the prompt and then waits until either A, P or R are pressed, then passes the value on. The CASE statement selects one of the dummy procedures.

```
PROGRAM Menu_Test_1 (input,output);
VAR reply:char;
  FUNCTION inchar:char;
    VAR reply:char;
    BEGIN
      reply := CHR(code0(&FFE0,0,0,0) MO
D &100) ;
      IF reply IN ['a'..'z'] THEN reply
:= CHR(ORD(reply) - 32) ;
      inchar := reply
    END ;
  PROCEDURE archive;
    BEGIN
      WRITE('Archiving data')
    END;
  PROCEDURE process;
    BEGIN
      WRITE('Processing data ')
    END;
  PROCEDURE readindata;
    BEGIN
      WRITE('Reading new data ')
    END;
BEGIN
  WRITE('Enter A)rchive, P)rocess or R)e
ad new data  ');
  REPEAT
    reply := inchar
  UNTIL reply IN ['A','P','R'];
  CASE reply OF
    'A' : archive;
    'P' : process;
    'R' : readindata;
  END;
END.
```

Name: Melter
Language: 6502
Author: Guy Eastwood

This very short piece of machine code will allow you to clear any screen using a variety of different ways – it'll even clear a Mode 7 screen, although it's much less impressive.

You supply the routine with two parameters, in *A%* you put an odd number (1, 3, 7 and so on) this controls the way the screen is cleared. And *Y%* should be set to the high byte value of the bottom of screen memory.

The value is used to increment an offset which is used to clear a byte in every page of screen memory. This offset eventually cycles round to zero at which time the screen is clear. The machine code is completely relocatable in memory and only takes 41 bytes.

```
100 REM * Screen Melt *
110 PROCinit:PROCassem
120 MODE 2:PROCtest:END
130 DEF PROCinit
140 Z%=RND(-TIME)
150 dend =&70:base =&71
160 ptr1 =&72:offs =&74
170 code =&900:osbyte=&FFF4
180 ENDPROC
190 DEF PROCassem.
200 FOR L%=0 TO 2 STEP 2
210 P%=code:[OPT L%
220 .melt STA dend
230  STY base:STY ptr1+1
240  LDX #0:STX offs:STX ptr1
250 .clear LDY offs:LDA #0
260 .regen STA (ptr1),Y
270  INC ptr1+1:BPL regen
280  LDA #19:JSR osbyte
290  LDA base:STA ptr1+1
300  CLC:LDA offs:ADC dend
310  STA offs:BNE clear:RTS
320 ]:NEXT:ENDPROC
330 DEF PROCtest:REPEAT CLS
340 FOR J%=0 TO 20:GCOL 3,RND(8)
350 PLOT85,RND(1279),RND(1023)
360 NEXT:REPEATUNTILGET=32
370 A%=RND(127)*2-1
380 Y%=HIMEM DIV256:CALL melt
390 PRINT"Space to run again";
400 UNTIL GET=13:ENDPROC
```

Get it right!

```
100 =     0 0 | 210 = 7CBB 4 |
110 = 597F F | 220 = DC7B 1 |
120 = 9D65 A | 230 = 5FA0 8 | 320 = 953B 9
130 = 40D7 1 | 240 = 54A6 D | 330 =   2F1 5
140 =   4E1 0 | 250 = C770 E | 340 = 3A21 4
150 = B58B 5 | 260 = 70C5 B | 350 = E7A5 A
160 = 22CE 0 | 270 = 6963 E | 360 = D71F B
170 = 5884 F | 280 = 2439 C | 370 =   9A A
180 = ED0F F | 290 = 8D5C 1 | 380 =   6CD 3
190 = B623 9 | 300 = 3D18 1 | 390 = CF23 1
200 = AAB9 C | 310 = 4E7D F | 400 = 3B5B E
```

Turn to Page 116 ▶

PROGRAM Library No. 8

◀ *From Page 115*

Name: Cat Bytes Back
Language: 6502
Author: Richard Ellison

I noticed a couple of problems with *DOG in Library number 4, the first of which is that it doesn't print the right number of files. This may be corrected by deleting line 320 and altering line 330 to read:

```
330  LSR A:LSR A:LSR A
```

Another problem is that it doesn't allow you to select the drive you want, as not all DFSs store their drive number in the same place. What is wanted is a program that works like the normal *CAT but also gives number of tracks and the number of files on the disc.

The program given here finds the currently selected drive using *osgbpb* with A set to 6, it then catalogues the disc (using *CAT from machine code) and finally it acquires track zero sector zero and prints up the number of tracks and files.

Type it in and save it as CatInfo when it's run it saves the machine code as C which you can then run as *C.

```
100 REM * Cat Plus *
110 osgbpb=&FFD1:osword=&FFF1
120 osasci=&FFE3:osnewl=&FFE7
130 oscli =&FFF7:fscv  =&21E
140 buff  =&A00:code=&900
150 fnum  =buff+5
160 tracks=buff+7
170 topdig=&8F:txtptr =&F2
180 FOR L%=0 TO 2 STEP 2
190 P%=code:[OPT L%
200  LDA (txtptr),Y:STA drive:PHA
210  LDA #5:LDX #drive MOD256
220  LDY #drive DIV256:JSR osfsc
230  JSR osnewl:PLA:CMP #48:BCS ok
240  LDA #6:LDX #drive MOD256
250  LDY #drive DIV256:JSR osgbpb
260  LDA drive+1
270 .ok AND #&03:STA block
280  LDA #0:STA block+1:STA topdig
290  LDA #buff DIV256:STA block+2
300  LDA #&7F:LDX #block MOD 256
310  LDY #block DIV 256:JSR osword
320  LDA fnum:LSR A:LSR A:LSR A
330  STA fnum
340 .printnum
350  CMP #10:BCS too_big:STA drive
360  LDA topdig:ORA #&30:JSR osasci
370  LDA drive:ORA #&30:JSR osasci
380  LDA tracks:CMP #&20
390  BNE not80:LDA #ASC"8"
400  JMP print_info
410 .not80 LDA #ASC"4"
420 .print_info STA tr:LDX #0
430 .loop LDA text,X:BEQ end
440  JSR osasci:INX:BNE loop
450 .end RTS
460 .too_big INC topdig
470  SEC:SBC #10:JMP printnum
480 .osfsc JMP (fscv)
490 .block OPT FNb(0):OPT FNd(buff)
500  OPT FNd(&01005303)
510  OPT FNb(&21):OPT FNd(0)
520 .text OPT FNs(" files on ")
530 .tr OPT FNb(0)
540  OPT FNs("0 tracks"+CHR$13)
550  OPT FNb(0)
560 .drive OPT FNw(&0D00):]:NEXT
570 $&700="SAVE C 900 "+STR$~P%
580 X%=0:Y%=7:CALL oscli
590 PRINT"Saved.":END
600 DEFFNd(D%)!P%=D%:P%=P%+4:=L%
610 DEFFNw(W%)!P%=W%:P%=P%+2:=L%
620 DEFFNb(B%)?P%=B%:P%=P%+1:=L%
630 DEFFNs(S$):$P%=S$:P%=P%+LENS$:=L%
```

Get it right!

```
100 =    0 0   280 = C9E3 2   460 = F56D D
110 = F366 6   290 = 8567 3   470 = 9558 2
120 = 86C1 0   300 = 60FC 4   480 = DDE7 8
130 = 4C96 3   310 = 2AAF A   490 = 68CC E
140 = 1297 3   320 = 178B B   500 = 1AD9 1
150 = C4E5 F   330 = BBC2 2   510 = D149 8
160 = 3C04 A   340 =  3C2 8   520 = A9D7 C
170 = 78E6 4   350 = CCBB 6   530 = 98C0 0
180 = AAB9 A   360 = C52D 0   540 = F6A7 0
190 = 7CBB 4   370 = 6AD5 6   550 = 9AD1 D
200 = F2B4 9   380 = A167 B   560 = 430B B
210 = 9CCF 8   390 = D350 E   570 = 759F B
220 = 98C8 7   400 = A5DA 3   580 = C836 A
230 = C49E 3   410 =  B45 8   590 = 25BB 9
240 = ADE9 0   420 = 616D 3   600 = CF0A 5
250 = D292 E   430 = 140D B   610 = 3646 B
260 = 4318 C   440 = 490F B   620 = 7623 5
270 = 14A6 A   450 = CFA8 F   630 = ECE4 5
```

Title: Striped Writing
Language: Basic
Author: Rupert Wood

In all screen modes except 2 and 7 you can force the operating system to think that it is in a 16 colour mode by directly poking the system workspace (byte &360). However if you do this then select foreground text red, then switch back to four colours, you get striped writing.

This program sets up various colour of stripes and displays them. There are 45 available options but I think these are the best.

```
  10 MODE 1:PROCRAW
  30 PRINT"Striped writing demo"
  40 PRINT"RED AND WHITE STRIPED!!!"
  50 PROCRAB:PRINT"Red and black strip
ed"
  60 PROCYAB:PRINT"Yellow and black st
riped"
  70 PROCYAR:PRINT"Yellow and red stri
ped"
  80 PROCBAW:PRINT"Black and white str
iped"
  90 COLOUR3:END
1000 DEFPROCRAW:PROC3(7,1,7):ENDPROC
1010 DEFPROCRAB:PROC2(2,1):ENDPROC
1020 DEFPROCYAB:PROC2(2,4):ENDPROC
1030 DEFPROCYAR:PROC2(2,6):ENDPROC
1040 DEFPROCBAW:PROC3(2,1,10):ENDPROC
1050 DEFPROC3(A%,B%,C%):COLOUR A%
1060 ?&360=15:COLOUR B%:COLOUR C%
1070 ?&360=3:ENDPROC
1080 DEFPROC2(A%,B%):COLOUR A%
1090 ?&360=15:COLOUR B%:?&360=3:ENDPROC
```

Get it right!

```
 10 = BE68 8    80 = 986F 4  1040 = 351A 9
 30 =  AE9 6    90 =  AD7 6  1050 = B8EC 8
 40 = 8507 E  1000 = 6EF7 4  1060 = 2FA4 6
 50 = 374D B  1010 = B22D A  1070 = 36B2 C
 60 = 6965 8  1020 = CA97 3  1080 = 569D 8
 70 = F6A1 6  1030 = 72C2 E  1090 = 63A5 4
```

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No strings to this puppet

I HOPE that BBC Micro owners are beginning to look forward to the cleverly Quilled games from Larsoft.

Their latest offer, The Puppet Man, is very elegantly designed and will particularly appeal to those who have a classical background or an interest in theatre.

Geoff Larsen described it as a kind of celebration of theatre and pantomime and I think that sums it up. Ordinary adventurers will like it too – with its well-crafted puzzles.

At the heart of the game are three of the nine Muses – Terpsichore, Thalia and Erato: They are reflected by three characters in the story who need help.

Ballerina cannot dance because she has lost her shoes, Tomaszewski the clown cannot perform until his eggshell "face" has been found and Pierrot has locked up his love poem to Columbine and thrown away the key. Your task is to find and restore these items to their owners.

Other characters in the adventure are Harlequin (naturally) and the Rub-a-Dub-Dub trio complete with wooden tub. Most of the characters can be spoken to and in spite of the dreadful puns, some helpful clues are provided.

Play is complex, several locations have to be revisited as the game unfolds and careful mapping is essential if the adventurer is to make any progress.

The descriptions cleverly maintain the atmosphere throughout the game and it was possible at times to forget that The Puppet Man is a Quilled offering.

In terms of difficulty I would rate it medium-to-hard but beginners at adventuring should not be put off – Geoff Larsen always provides proper help for those who are stuck (so long as you send a stamped, addressed envelope).

I have described Larsoft adventures as consistently at the top of division two and this latest game is no exception; it is better than some costing twice the price and you should add it to your collections.

The Puppet Man costs £3.95 and is available from Larsoft, 4 Chantry Road, Clifton, Bristol BS8 2QD.

I now have a new example of frustration: A Robico disc has just landed on my desk: It is not Master compatible, my own Model B is still being repaired and my borrowed machine is a Master!

However, I shall deal with The Hunt – Search for Shauna as soon as I can. You will be interested to know that The Hunt is an illustrated adventure.

For this month's tutorial, I want to look at a section of Level 9's Dungeon Adventure to see what can be learned from clever room descriptions and how to take calculated risks – having saved first. So, examine the logical map in Figure I for a minute or two before reading the commentary.

Please remember that the comments I have added to the room descriptions are often the fruit of several hours thinking and experimentation.

I always find it useful to add suggested courses of action to the map, even when I don't follow them up right away. When that is the case I include a few question marks to remind myself that the action has not yet been tried.

The spiral ramp is the core of the Central Dungeon in the game and it contains a number of nasty surprises as well as many treasures.

Room	Description	Move	Result
82	On the ramp, hand sign points to narrow opening	D	80
	Throw ring to go safely.....	IN	83
		U	84
83	Small soft room, 5 fleshy pillars; ruby	S	82
84	On the ramp outside long room with scratches	D	82
		IN	85
		U	88
85	In East crusher room (drop wedge)	E	84
	Wait around a bit	W	86
86	West crusher room by door into treasure chamber	E	85
		W	87
87	Treasure chamber; agate	E	86
88	Wobbly section	D	84
	When boulder comes, pop into a doorway	U	89
89	On the ramp outside a round opening	D	88
		IN	90
		U	91
90	On the brink of a deep dark pit	E	89
		D	71
91	On a loose section of the ramp	D	89
		U	92
92	On the ramp outside a dark doorway	D	91
		IN	93
		U	95
93	Dead end dark room; black pedestal	W	92
	Wedge, also Sphere, (Lead this to the other one)	U	94

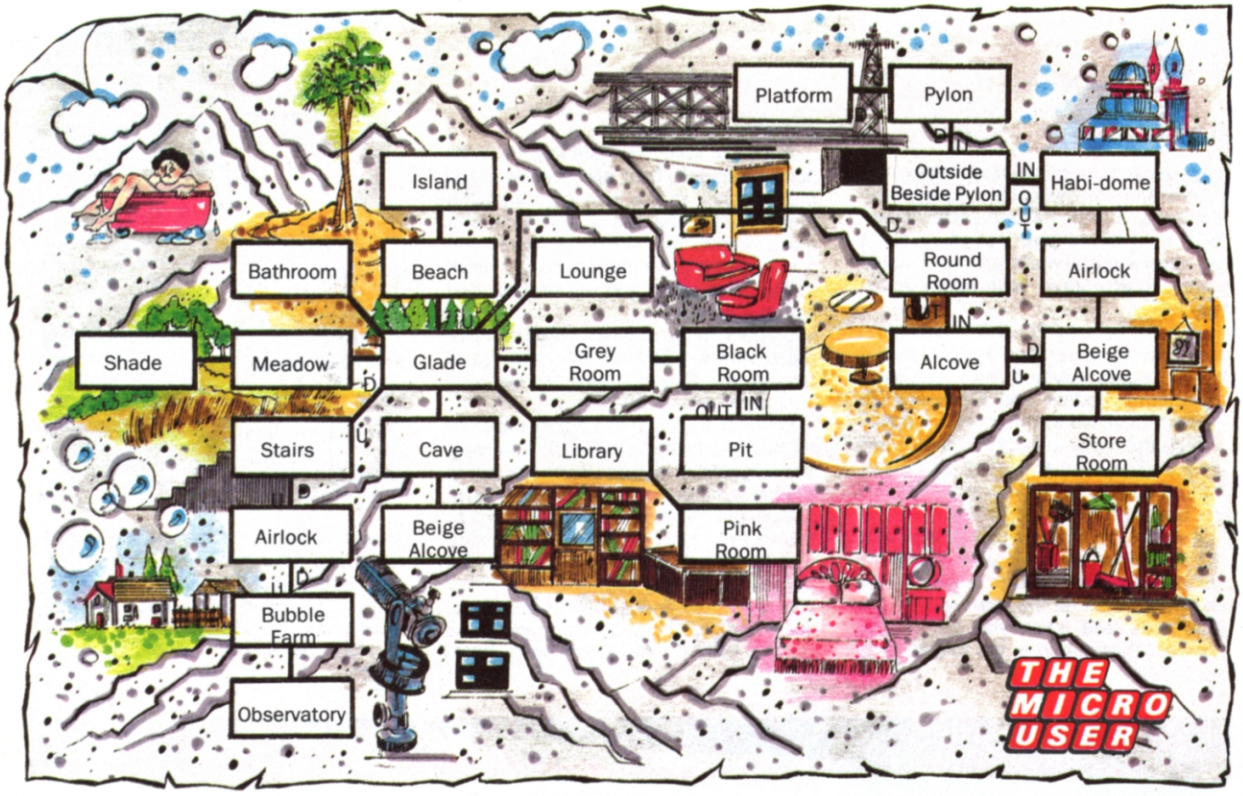
Figure I: Dungeon Adventure logical map

The hand sign (82) proved to be a clue to the sort of room location 83 was rather than a mere signpost.

To begin with I strolled in and duly died – but I had saved my position on the ramp before entering so that didn't matter. Eventually, I found a ring that was too hot to hold without protection.

Once I'd got the gloves, I threw the ring into the hand room and found that I could then enter safely.

The scratches outside room 84 promised trouble and so it proved. Thus when I located the dead end dark room and found a wedge, I went back and tried



Part 6 of Stuart Booth's Snowball map – the Habi-Dome or Snowball Hilton

again. I still saved first: Over confidence is the death of too many adventurers.

The final problem in this section was signalled by the sound of a boulder coming down from above when you are on the wobbly section of the ramp.

This problem is designed so that you cannot move into a room straight from the wobbly section.

If you retreat down, you land up in the crusher room again – you do not have the wedge at this stage. Thus it becomes a question of having the courage to move up towards the approaching boulder and then going into the round opening so that it passes down the ramp without killing you.

Notice, too that if you decide to go down from the brink of the deep dark pit and then move out from your destination, you end up lower down the ramp. It's a modest teleport device though not to be confused with the collar activated one.

Next month the column will feature the large number of interesting letters from readers that have built up in my file and hopefully, a review of Temple of Terror. Until then, happy adventuring.

Solution to Emerald Isle, part 2.

Module 4: Go back through the cave to the stream and fill the lamp with (fresh) water. You may be able to fill the lamp with sea water but knowing Pete Austin I wasn't taking any chances.

Put the carbide granules in the lamp and you can then LIGHT LAMP as an alternative to using the short lived matches.

To turn the lamp off, enter EXTINGUISH LAMP and expect a grudging response when you insist. This may mean its an everlasting lamp, I never bothered to find out.

Finally, note that you can retrace your steps in dark areas without using the lamp and survive. You really have to blunder around a long time in the dark before you are killed.

Light the lamp when returning through the cave this time and collect the map that you will now be able to see there. Next, visit the mine with the lamp and fence post.

Take the shovel first and dig to find the platinum pyramid, then push the ceiling with the fence post in the dusty tunnel. Now get the rope and pick from the mine debris. Dig here for the opal and go back to the middle of the beach once again.

Don't forget to collect the post on the way as you will need this later. Dig with the shovel in the middle of the beach. The spikes you find need to be taken and worn. Leave the post and treasures here.

Climb back into the canoe, this time heading N and then W into crystal waters and up the blowhole (using the lamp) and visit the car park to find the wallet.

Don't go straight back to the beach, but visit the north isle and dig below the palm tree for the doubloons and the figurine.

Take the wallet back to the police station near the seaside railway station and enter DROP WALLET to get the reward money. After that, drop everything at the middle of the beach once more and save.

Turn to Page 120 ▶

◀ *From Page 119*

Module 5: Take the reward money and go overseas to the cobble square with the shops. Buy the hammer, screwdriver, food, then the picture last of all: Do it any other way and you'll not have enough money to go round. Back again to the beach.

Visit the hut and RELEASE PLANK with the claw hammer and return to the beach. Equip yourself with the short rope, lamp, ladder and plank and go through the cave to the stream gravel.

Drop the plank at sedge tussocks and cross to horrid heights. Find and examine the boulder to get the small key and get the paper from the hollow.

Visit the river valley, extend and drop the ladder across the stream. Cross the ladder to the hill slopes to find the treasure chest, then tie the short rope to the pinnacles and down you go for the coronet. Back again to the beach. Drop everything and save.

Module 6: Take the small key, the gold coin, boathook, food and season ticket and go back to the tree city. Visit the plaza, climb the tower and wind the clock. Leave the small key here, you won't need it again. When you get down to the plaza again, you will be rewarded with the ornate key.

Go back to the railway station and use the ornate key to open the gate, go W through the gate and leave the key here for future use.

Cross the bridge and catch the train for the forest village, taking and wearing the armband as you go. Give the food to the beggar in return for the identity card.

Visit the hospital and give the nurse the gold coin in return for being inoculated. Use the boathook to pull the hanging vines so that you can swing safely across the river full of crocodiles. Get the bowl from the whispering grass and go back to the beach once more.

Helpline

Neil Shipman has written in with some tips for **Dodgy Geezers.** The manhole cover can only be lifted once you've chosen your gang and got into part two of the adventure.

Here's how to recruit Tweedle: Phone Ken from the kaff (George gave you the number just before you were released from prison) and then go to the dog track and give Tweedle Ken's tip.

Meet him later in the Fish Finger pub. At the one hundred move count, enter the arcade and then go straight to the graveyard. Meet up with Tweedle again at the warehouse, wait, then search it. You can now enter the club and Soapy will talk if you buy enough rounds of drinks.

Don't forget to drop the key again once you have been through the gate. Whatever you do, don't lose track of this key, it is needed in the endgame. Drop everything and SAVE again.

More next month!

The truth about TELEX

How much does it cost to go on Telex?

You could go the conventional way and buy a dedicated Telex machine. The cheapest will cost you £1,604 (the Whisper), the dearest £2,892 (the Cheetah). You will also need a separate telephone line, costing £101 to install, plus £404 a year rental. That's a total outlay over the first year of a minimum of £2,109. (All prices include VAT.)

Or you could do what more and more BBC Micro users are doing – use your BBC Micro to double as a Telex machine. And just use your ordinary telephone!

How do I turn my BBC Micro into a Telex machine?

All you need is a modem and appropriate communications software (see the advertisements in this issue), a telephone, and a subscription to *MicroLink*.

Telex is just one of a growing number of services available to micro users on *MicroLink*. You can also read the news as it happens, go teleshopping, create your own closed user group, send telemessages and electronic mail right round the world, download free telesoftware programs directly into your micro . . . and much more.

But why use Telex?

Because it's a standard means of instant communication between businesses. Today there are 150,000 Telex machines in use in Britain – and more than 2 million worldwide. It's used to dramatically speed up business communications – just as quick as using the phone but far more efficient, because you have a hard copy of every "conversation" for your records.

But there's a big bonus you get when you use *MicroLink* for Telex that the conventional way doesn't offer.

With *MicroLink* you don't HAVE to be in your office to send or receive Telex messages. You can just as easily use your computer at home (or even a portable). So now you can check whether there are any Telex messages waiting for you – anywhere, anytime. How's that for your business efficiency?

How to join: See Page 47

TubeLink

Advanced RAM Utilities Plus

A 16k ROM packed with 30 genuinely useful utilities for Solidisk sideways RAM users (BBC Model B) ranging from the 16k unit to the 256k board. Greatly eases management of sideways RAM, as well as everyday disc and machine use. Available on disc for sideways RAM, or on 16k EPROM. Amazing value at £9.95 for a 40/80 track 5.25" disc, £14.95 on EPROM.

The Tube Toolkit ROM

The ultimate utility ROM designed for the second processor user. Among its many features, the ROM contains powerful memory transfer functions allowing both large and small blocks of memory to be copied quickly from one processor to the other; a full-feature 65C02 disassembler; TUBE memory editor; and a versatile printer buffer function. Ideal for Acorn 6502 and Master Turbo Co-processors! Available on a 40/80 5.25" disc at £9.95 for loading into sideways RAM or on 16k EPROM for only £14.95.

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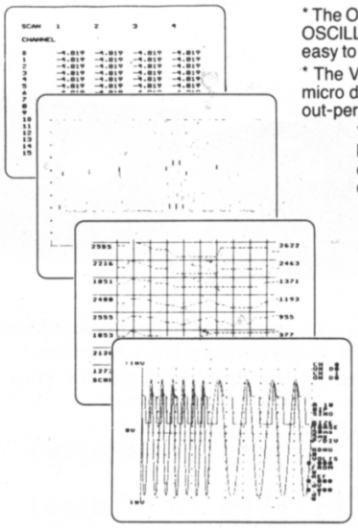

* The OASIS Virtual Instrument System (VIS) emulates conventional DVM, OSCILLOSCOPE, CHART RECORDER, X/Y PLOTTER and DATA LOGGER in one easy to use package and also provides sophisticated data analysis tools.

* The VIS data acquisition module and instrument emulation software turns the BBC micro directly into a versatile and flexible laboratory measurement system which can out-perform and is easier to implement than IEEE 488 linked systems.

* VIS professional, ready-to-use instrument emulations include:
Multi-channel DVM with real time numeric and graphic displays, storage SCOPE with on-screen measurement and waveform zoom, DATA LOGGER with logged data compression algorithm and X/Y PLOTTER with programmable integration periods.

HARDWARE

VIS is based on a precision computer controlled 16 channel A-D converter, with six programmable ranges and read rates of 50k samples per second at 8 bit resolution, 25k at 12 bit.

This simply installed unit has proven long term stability and reliability.

SOFTWARE

The menu-driven acquisition, analysis and display programs combine on screen set up of measurement parameters, SPREADSHEET data manipulation and a range of data display formats, including 8 trace CHART RECORDER and oscillogram.

Total data mobility from measured information to memory, disk, screen and HARD COPY output.

The OASIS VIS carries full documentation to allow the beginner or professional programmer to create new interface applications or personalised instrument emulations.

PRICE

At £399 (ex VAT), the price of the complete VIS system is less than any one of the instruments it replaces. Performance enhanced versions also available, e.g. higher acquisition speeds.

For fast delivery, phone your order on 0603 747887. Technical queries answered and requests for further data on this number.

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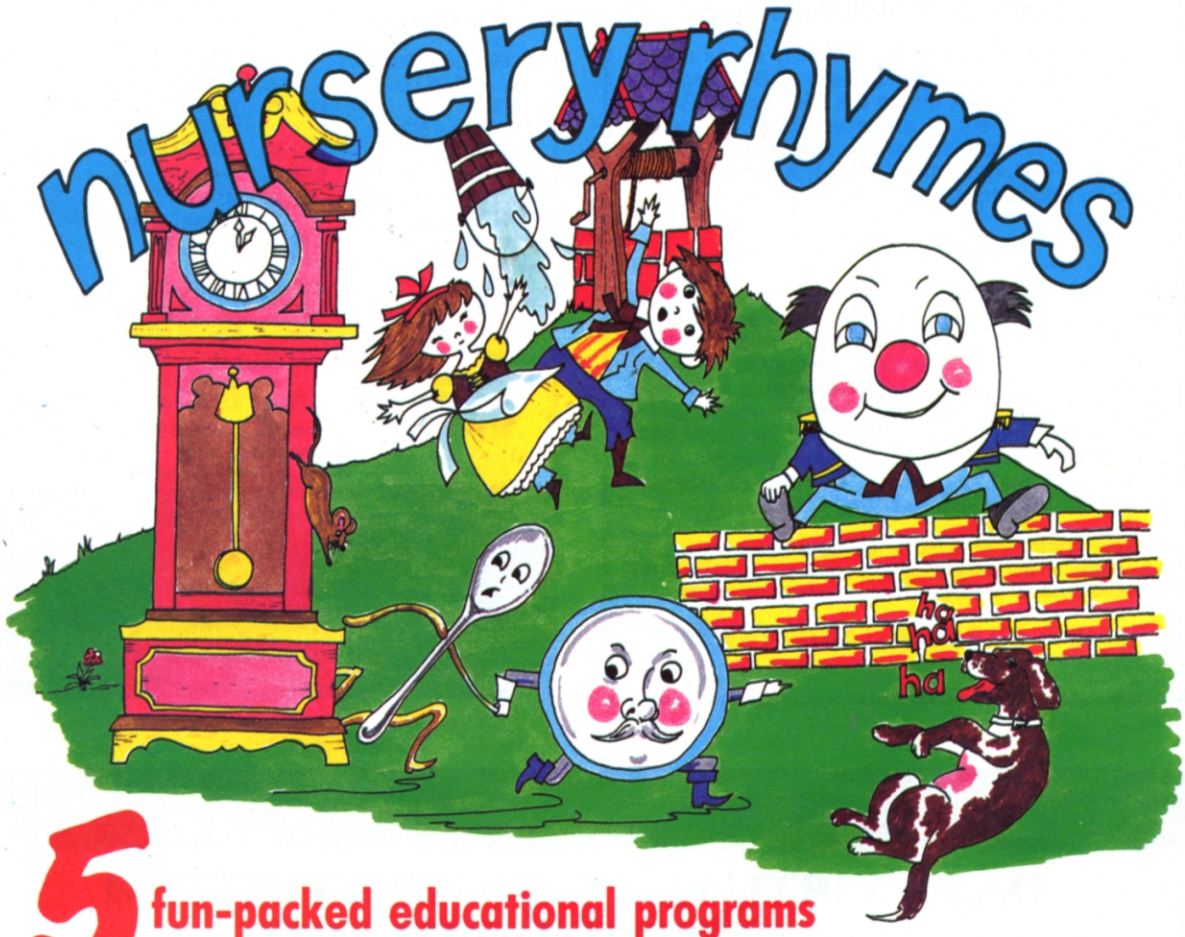
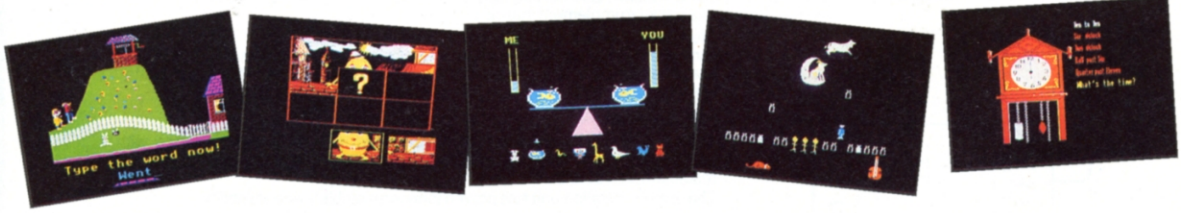
Design Consultancy

THE MICRO USER MAIL ORDER OFFERS

nursery rhymes



5 fun-packed educational programs . . . for young children everywhere



This delightful collection of programs is based around children's favourite Nursery Rhymes. There's plenty of sparkling colour, sound and captivating animation to keep them riveted – and as they play they'll be learning all the way.

- ★ Tell the time with Hickory Dickory Dock.
- ★ Assemble the jigsaw in Humpty Dumpty.
- ★ Learn to spell with Jack and Jill.
- ★ Match the animals in See Saw Marjory Daw.
- ★ Play an exciting game in Hey Diddle Diddle.

Children as young as two will be entertained for hours with these interactive programs. Don't miss out on this beautiful gift for your family – and at a very special price.

ONLY £5.95 (cassette)
£6.95 (5¼" disc)
£7.95 (3½" disc)

Suitable for BBC Micro, B+, Master and Master Compact

TO ORDER TURN TO THE FORM ON PAGE 141

GALLERY

No. 7

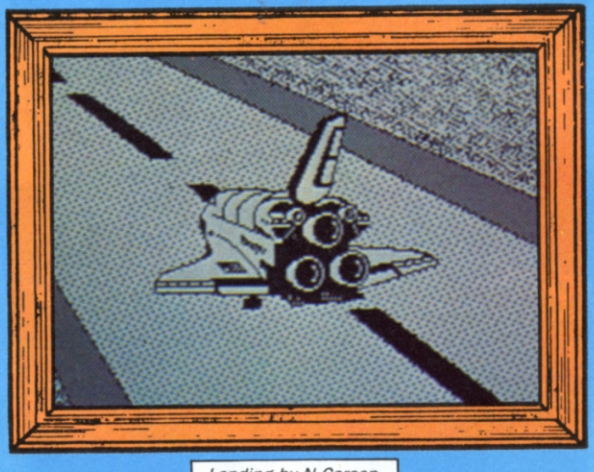
THANKS for the pictures – keep sending them in. This month we feature some works of art by Jeremy Moss, N. Carson, Jim Crossley and Matthew Searle. We don't mind whether it's just one masterpiece or a full gallery that you send – if the pictures are good you'll see them in print. Please send screen dumps on disc or tape with a note saying which mode they use.

The address to send them is Gallery, The Micro User, Europa House, 68 Chester Road, Hazel Grove, Stockport SK7 5NY.

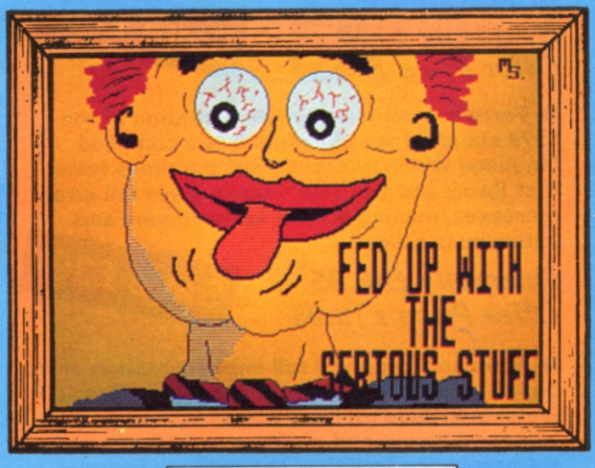
Android Dreams by Jim Crossley

Peeling by Jeremy Moss

Magic by Jim Crossley



Landing by N.Carson



Serious Stuff by Matthew Searle

THE MICRO USER MAIL ORDER OFFERS

Amazing Acornsoft bargains

GAMES

THREE tapes for the price of ONE!

Revs and Aviator are two of the best simulations ever produced for the BBC Micro. And with Revs Four Tracks you will be able to experience the excitement of driving around some of Britain's most renowned racing circuits.

Games Galore
Normally £39.85
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Save £30!

LANGUAGES

Powerful roms pack a punch

● BCPL is the most flexible of modern structured languages and is the easiest to learn. It is particulary good at handling Input and Output, and is perfect for writing utilities, screen editors, control systems – even games software. The package includes a language rom, a disc containing compiler, screen editor, 6502 Assembler, utilities – and a 450 page User Guide.

BCPL Bundle
Normally £109.70
Offer Price £29.95

Save £80!

● Forth is a complete implementation of the 1979 standard specification. It is a compiled language which typically runs five times faster that Basic, and this rom version gives full error messages, making it ideal for beginners and enthusiasts alike.

Normally £49.85
Offer Price £19.95

Save £30!

● Acornsoft Logo is a full implementation of the Logo language widely used in schools. Special features include multiple screen turtles, extensive sound and graphics commands, and list processing facilities. The package includes two roms, three manuals, a reference card, one disc and a cassette.

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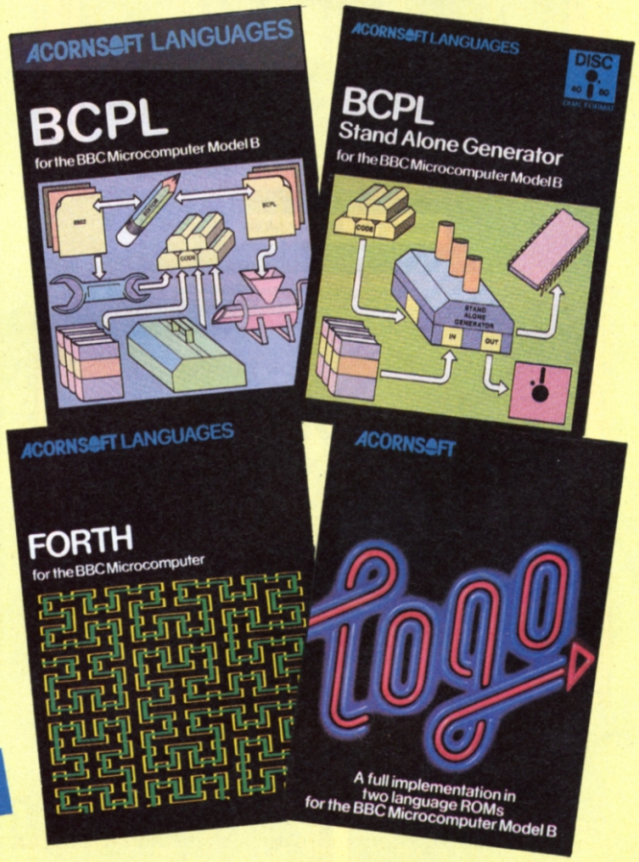
Special offer £29.95

Save £39!



THE MICRO USER MAIL ORDER OFFERS

MUSIC

Make your micro sound sensational!

Creative Sound is a beautifully presented 320 page book, packed with everything you need to know about music on the BBC Micro.

The authors are musician, composer and programmer David Ellis, and Chris Jordan, who designed the BBC Micro's sound system as well as the Acorn Music 500 and 5000.

There are more than 30 program listings, including programmable synthesisers, sequencer, music compiler, example tunes, Mozart's Musical Dice Game, composition aids, pitch trainer, scales program – and sound effects galore.

Creative Sound
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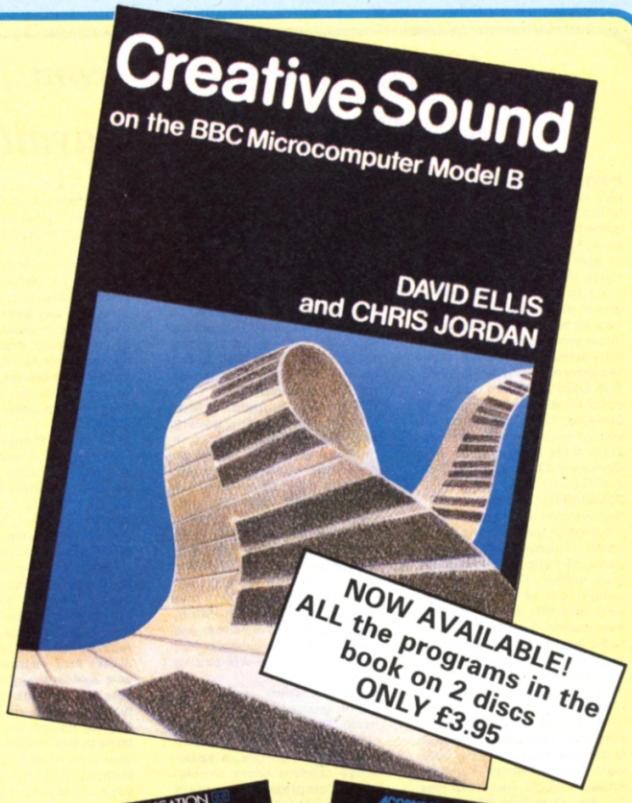
Offer Price £4.95

Save £5!



EDUCATION

For the younger micro user . . .

- ABC is a unique writing tool for seven year olds and upwards, designed to be easily operated and quickly understood.

- Spooky Manor is an adventure game for up to four players that encourages planning and logical thinking.

- In Talkback you can hold conversations with the computer by typing in sentences – and even create your own computer characters.

- Drill, cut, squash and paint your creations using the machines in the Workshop. Suitable for children from the age of three upwards.

Previously each package cost £9.95 – now you can buy all four tapes together for the same price.

Educational extravaganza
Normally £39.80
Offer price £9.95

Save £30!

TO ORDER TURN TO THE FORM ON PAGE 141

THE MICRO USER MAIL ORDER OFFERS

All the programs from the last 12 months of The Micro User are available on tape and disc!

NOVEMBER: Maltese Cross, play this superb domino simulation. Life, the generation game to produce colourful patterns. Star Print, a clever routine to give easy access to print styles. View Ruler, a handy program to provide View with a cursor on its ruler line. Shadows, an educational program to throw some light on the subject. Dual Screens, a routine to store two screens in memory at once. BOS Editor, a superb on-screen editor for Basic programs. Body Building, three programs for your pressure sensitive devices. *PLUS three more files for Any Questions (Office practice, DIY, and Tables).*

DECEMBER: Santa's Sleigh, help Santa in his gift warehouse – but watch out for the monster spider. Christmas Box, a superb game of logic to test the old grey matter. Tables, take the tedium out of multiplication tests with this short but effective routine. Flood Fill, a versatile fast fill routine. Scroller, a machine code program to provide fast scrolling in any direction. Speech, a software utility to get your micro to talk back to you. Break Recover, hold on to variables when Break is pressed. Body Building, software for the relative humidity measure. *PLUS Two more files for Any Questions (Arithmetic and Home Economics).*

JANUARY 1987: Ayo, the game of Africa, needing strategy and foresight. Flying Fingers, put your typing to the test in this fast arcade style test. Function keys, access 16 function keys while retaining full cursor editing. Disassembler, handles all 6502 and CMOS 65C02 instructions. ADFS Menu, step your way quickly through the hierarchical menu system. Tweetie, illustration of some of your micro's superb graphics capabilities. Body Building, the program for your BBC Micro drumkit. *PLUS Two more files for Any Questions.*

FEBRUARY: Rhondo, a fast-action shooting gallery spectacular. 6502 Games, a demonstration of collision detection routines. Choice, develop your childs decision making skills. Map test, grid reference game Date Stamp, save time when filing. List Hold, stop that scrolling screen. Wordwise Plus Index, indexing plus file description. Compressor, variable name compactor. Body Building, super fast A to D converter and multi channel oscilloscope. *Plus Save a life, the life-saving tutorial.*

MARCH: Dino, ride the gobblosaurus in this prehistoric romp. Birthday Mystery, discover the implement of a serious crime. Half-Life, a radioactive random decay simulation. Compressor II, create multi-statement lines. Teletext Carousel, a utility for the Morley Teletext Adapter. Hac Man, the Jet Set Willy II Upgrade. Command Clashes, rom problem solved. Body Building, software for temperature measurement. 6502 Games, collision detection demonstration. Library, three useful routines.

APRIL: Hunkie Egg, collect the eggs in our fast action Easter game. Biomorphs, create creatures with this fascinating simulation. Disc Protection, a utility to stop piracy disc. Counting, the program for the DIY keyboard. 6502 Games, make your sprites follow the leader. *Plus four more routines from the Library.*

MAY: Ducks Dinner, help Daffy Duck get his dinner and avoid the poison skulls. Ludo, an excellent implementation of the popular family game. Interactive Programs, incorporate the wealth of teletext into your programs. Disc Cataloguer, find misplaced files fast. Sid and the Beetle, a simple teaching aid for logical thinking. 6502 Games, programs to get sprites moving in a window. *Plus four more routines from the Library.*

JUNE: Prof McBrolly, pit your wits against the goblins in this race against time. Checksums, type in listings in confidence. Raglan, design your own patterns to any size. Prommer, run your own programs from rom. Button, double the firepower of your Compact. Cansim, a Canadian agricultural simulation. Body Building, the software to drive your video digitiser. *Plus four more routines from the Library.*

JULY: Diamond Quest, dodge boulders to collect the jewels. Espionage, infiltrate an enemy base. Printer Buffer, work while you print. Super Line Editor, powerful Basic line editor. Encrypt, a disc-based utility. Basic Repair, cancel those Bad program errors. Basdat, bytes to /Basic – a unique data creation program. Logo-Tank, train your imagination and visual memory. Computers in Action, verify your payslip. *Reply, add new star commands. *Plus more routines from the Library.*

AUGUST: Survive! Fast action beat the computer or two player game. Address Book, short and powerful utility. Ram Arrays, increase your Basic capacity by 8k or more. Computing in Action, wallpaper calculator. Programming Adventures, more on how to create your own quests. *Plus more routines from the Library.*

SEPTEMBER: Soccer Manager, take your team to the top of the First Division. Disc Copy, a great utility to banish those file transfer blues. Fuel Consumption, find out how much your car uses. Body Building, taking a step in the right direction with the map measurer listings. Programming Adventures, learn how to write better Basic with routines to squeeze bytes into bits. Plus many more high quality routines from the Library.

OCTOBER: Space Arena, fight to the death in this fast action two player space game. Hit the Beat, lay down that rhythm and super screen design program. see how long a sequence you can play. MicroWorks, let your imagination run wild with a Point of Interest, how much is your loan really costing? Disc Servicing, Don't lose your valuable disc data. Late News, world events in print at the speed of light from CEEFAX. Ample Music, learn the best techniques for programming your Hybrid system. Checksums, check your typing accuracy fast with machine code checksums. *Plus five more routines from the Library.*

Save wear on your fingers and ensure all your programs are error-free by using our monthly tapes or discs. They are only:

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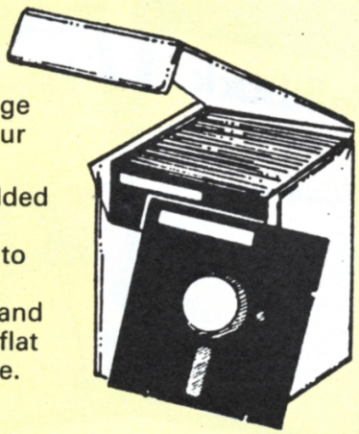

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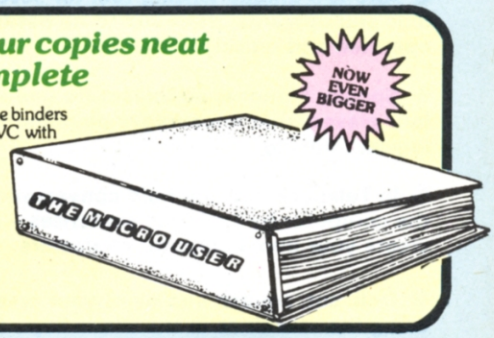

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YOU TOO CAN BE GINGER BAKER

Matthew Holroyd's bright new look at the Simon game

THUNDER Drums is based on the concept of the popular Simon game and provides a new addictive approach to the game.

Type in and save the program, using the checksums to ensure you have made no mistakes. When the program is run it relocates itself to make room for the variables. The drum kit is drawn using circle and ellipse routines and so takes time. When everything is done there is a flash of light and you're ready to play.

I suggest you select option three at first and smash your way around the drums until you are familiar with the keys. Each time you hit a drum key the drum or cymbal flashes red.

When you play the game the computer chooses a random drum or cymbal to be hit and adds it to the sequence generated, then it plays the sequence.

You must repeat the sequence and each time you strike a drum PROCcheck is called to see if the number of the drum struck is equal to the number in the sequence. If it is then the program returns to the keyboard and awaits the next drum strike. If not then the computer has won and the game stops.

Game two is exactly the same as game one but the drum heads do not flash red when the sequence is being demonstrated. This means the player must rely on his knowledge of the drum sounds as well as memory when repeating the sequence.

Thirty notes must be successfully repeated to win. If this is too much for you change the value of *seqlen* in line 50, which alters the value being tested in line 520.

Scratch them skins, crash them cymbals and the best of luck in those frustrating hours ahead.

MAIN PROCEDURES

hit	Handles all the calculations and decisions each time a drum is struck.
sound()	Makes the appropriate sound.
auto	Plays the sequence so far and adds a new note to it.
check	Checks each note against the note in the sequence.
wrong	Stops the game, resets the variables and restarts the game.
set	Sets up the game.
start	Gives the three game choices.
vars	Sets up the variables.
win	Plays a drum solo and prints the winning message.
keys	Displays the keys on the drums in Practice mode.
inst	Displays the instructions and waits for the game to be started.

MAIN VARIABLES

Q%	The game choice.
D%	The number of the drum being played.
len%	The length of the sequence so far.
T	Flag, 0 is players turn, 1 is computers turn.

```
   10 REM   Thunder Drums
   20 REM by Matthew Holroyd
   30 REM (c) The Micro User
   40 REM ==================
   50 PROCreloc(&1100):seqlen=30
   60 MODE2:DIMseq(seqlen),cd(36),sd(36)
   70 FOR W%=10 TO 360 STEP 10:cd(W%/10)
=COSRADW%:sd(W%/10)=SINRADW%:NEXT
   80 PROCvars:PROCinst:PROCset:PROCstar
t
   90 IF Q%<3 AND T=0 THEN PROCauto
  100 PROCkeys:IF INKEY-17 PROCvars:PROC
start:GOTO90
  110 IF D%>0 THENPROChit
  120 IF wr%=1 THEN PROCvars:PROCstart
  130 GOTO90
  140 DEFPROChit:IF Q%<3 AND T=1 THENPRO
Ccheck
  150 IF Q%<3 AND count=len% THEN T=0
  160 IF Q%=2 AND T=0 THEN GOTO 180
  170 VDU19,D%,1,0;0;
  180 PROCsound(D%-6)
  190 TIME=0:REPEAT UNTIL TIME=7
  200 IF D%>12 THENVDU19,D%,3,0;0; ELSE
VDU19,D%,7,0;0;
  210 ENDPROC
  220 DEFPROCkeys
  230 IF D%>0 THEN GOTO 340
  240 Z%=FNkey
  250 IF Z%=98 D%=7:ENDPROC
  260 IF Z%=104 D%=8:ENDPROC
  270 IF Z%=97 D%=9:ENDPROC
  280 IF Z%=66 D%=10:ENDPROC
  290 IF Z%=82 D%=11:ENDPROC
  300 IF Z%=99 D%=12:ENDPROC
  310 IF Z%=88 D%=13:ENDPROC
  320 IF Z%=65 D%=14:ENDPROC
  330 IF Z%=81 D%=15:ENDPROC
  340 D%=0:REPEAT UNTIL Z%<>FNkey
  350 ENDPROC
  360 DEFFNkey:LOCAL A%:A%=12
  370 =(USR(&FFF4)AND&FF00)DIV&100
  380 DEFPROCsound(S)
  390 ON S GOTO 410,420,430,440,450,460,
470,480,490
  400 ENDPROC
  410 SOUND1,1,5,1:SOUND0,2,2,1:GOTO400
  420 SOUND1,1,10,1:SOUND0,2,5,1:GOTO400
  430 SOUND1,3,20,1:SOUND0,-12,2,1:GOTO4
00
  440 SOUND1,3,16,1:SOUND0,-12,2,1:GOTO4
00
  450 SOUND1,3,12,1:SOUND0,-12,2,1:GOTO4
00
  460 SOUND1,3,5,1:SOUND0,-12,2,1:GOTO40
0
  470 ENVELOPE4,2,0,0,0,2,3,4,126,0,0,-2
,126,126:SOUND0,4,4,2:GOTO400
```

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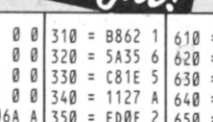
```
  480 ENVELOPE4,2,0,0,0,0,2,3,4,126,0,0,-4
,126,126:SOUND0,4,5,2:GOTO400
  490 ENVELOPE4,8,-1,-1,0,1,1,4,126,0,0,
-18,126,126:SOUND0,4,6,1:GOTO400
  500 DEFPROCauto
  510 TIME=0:REPEAT UNTIL TIME=120
  520 IF len%=seqlen THEN PROCwin:wr%=1:
ENDPROC
  530 len%=len%+1:seq(len%)=RND(9)+6
  540 FOR W%=1 TO len%
  550 TIME=0:REPEAT UNTIL TIME=25
  560 D%=seq(W%):PROChit
  570 NEXT W%
  580 count=0:T=1:D%=0:ENDPROC
  590 DEFPROCcheck:count=count+1
  600 IF D%=seq(count) THEN ENDPROC ELSE
 PROCwrong
  610 ENDPROC
  620 DEFPROCwrong:wr%=1
  630 SOUND0,-15,2,5:COLOUR2:PRINTTAB(6,
3);"WRONG!";:TIME=0:REPEAT UNTIL TIME=20
0:PRINTTAB(6,3);"      ";
  640 ENDPROC
  650 DEFPROCset
  660 VDU17,128,12:RESTORE960
  670 VDU23,1,0;0;0;0;:FOR W%=7 TO 15:VD
U19,W%,0,0,0;:NEXT W%:VDU19,6,4,0;0;19,3
,0,0;0;
  680 ENVELOPE1,1,2,0,-3,1,1,2,120,0,-13
,-6,126,126:ENVELOPE2,1,0,0,0,1,1,2,120,
0,-15,-5,126,126:ENVELOPE3,2,1,0,-1,1,2,
1,123,0,-4,-19,124,126
  690 PROCthree("THUNDER KING",250,1000,
4,3)
  700 VDU18,0,3:step=200:pos=0:FOR W%=1
TO 6:pos=pos+step:MOVE0,pos:DRAW1279,pos
:step=step/2:NEXT W%
  710 FOR W%=1 TO 29
  720 IF W%=1 OR W%=13 OR W%=14 OR W%=15
 THEN READ F%,E%,R%,C%:PROCcirc(F%,E%,R%
,C%):NEXT W%
  730 IF W%=17 THEN VDU18,0,132,24,810;2
30;1090;370;16,26
  740 IF W%=21 THEN VDU18,0,132,24,510;3
60;770;450;16,26
  750 READ F%,E%,A%,B%,C%:PROCell(F%,E%,
A%,B%,C%)
  760 NEXT W%:FORW%=0 TO 15:VDU19,W%,1,0
;0;:NEXT W%:TIME=0:REPEAT UNTIL TIME=10:
FORW%=1 TO 7:VDU19,W%,W%,0;0;:NEXT W%:FO
RW%=8 TO 12:VDU19,W%,7,0;0;:NEXT W%
  770 VDU19,13,3,0;0;19,14,3,0;0;19,15,3
,0;0;19,0,0,0;0;:D%=8:PROChit:D%=15:PROC
hit
  780 ENDPROC
  790 DEFPROCstart
  800 VDU17,6:PRINTTAB(1,2);"1";TAB(1,3)
;"2";TAB(1,4);"3";TAB(3,5);"Press 1,2 or
 3";
  810 VDU17,3:PRINTTAB(3,2);"Game 1";TAB
(3,3);"Game 2";TAB(3,4);"Practice";
  820 IF INKEY(-49) THEN Q%=1:GOTO860
  830 IF INKEY(-50) THEN Q%=2:GOTO860
  840 IF INKEY(-18) THEN Q%=3:GOTO860
  850 GOTO 820
  860 VDU28,0,5,16,2,12,26
  870 IF Q%=3 THEN PROCshow
  880 ENDPROC
  890 DEFPROCcirc(F%,E%,R%,C%)
  900 VDU18,0,C%,29,F%;E%;:n=0:th=2*PI/3
0:MOVE R%,0:FOR T%=1 TO 30:n=n+th:S%=R%*
COS(n):A%=R%*SIN(n):MOVE0,0:PLOT85,S%,A%
:NEXT T%:VDU29,0;0;
  910 ENDPROC
  920 DEFPROCell(F%,E%,A%,B%,C%)
  930 VDU18,0,C%:MOVE F%+A%,E%:FOR T%=1
TO 36:cos=cd(T%):sin=sd(T%):R%=1/SQR(cos
*cos/(A%*A%)+sin*sin/(B%*B%)):X%=R%*cos:
Y%=R%*sin:MOVE F%+A%,E%:PLOT 85,F%+X%,E%
+Y%:NEXT T%
  940 ENDPROC
  950 REM * base shell *
  960 DATA 640,330,200,4
  970 REM * mid tom *
  980 DATA 640,580,120,80,6,640,580,115,
75,0,640,580,105,65,10
  990 REM * left tom *
 1000 DATA 415,500,120,80,4,425,530,120,
80,6,425,530,115,75,0,425,530,105,65,9
 1010 REM * right tom *
 1020 DATA 860,470,120,80,4,860,520,120,
80,6,860,520,115,75,0,860,520,105,65,11
 1030 REM * base skin *
 1040 DATA 640,300,200,6,640,300,190,0,6
40,300,180,7
 1050 REM * floor tom *
 1060 DATA 950,220,150,45,6,950,230,145,
45,4
 1070 DATA 950,370,150,45,6,950,370,140,
35,0,950,365,130,35,12
 1080 REM * snare *
 1090 DATA 640,365,135,40,6,640,375,130,
40,4
 1100 DATA 640,460,135,40,6,640,460,130,
35,0,640,460,120,25,8
 1110 REM * cymbals *
 1120 DATA 1000,750,175,70,13,400,730,15
0,60,15,280,640,170,80,0,275,635,170,80,
14
 1130 DEFPROCvars
 1140 T=0:len%=0:count=0:wr%=0
 1150 ENDPROC
 1160 DEFPROCwin:VDU19,6,2,0;0;
 1170 DATA 9,6,9,6,11,6,9,6,9,6,11,3,11,
3,10,3,10,3,12,3,12,3,9,6,9,6,11,6,9,6,9
,6,12,3,11,3,11,3,10,3,11,3,11,6,9,6,9,6
,11,6,9,6,12,3,11,3,11,3,10,3,12,3,11,3,
11,3,10,3,7,25,15,20,8,3,8,3,8,3,7,3,8,3
,8,3,8,3,8,3
 1180 DATA 12,3,8,3,12,3,12,3,11,3,14,6,
9,3,9,3,10,3,10,3,11,3,11,3,12,3,12,12,7
,3,8,12,15,3,13,0
 1190 RESTORE1170
 1200 FOR W%=1 TO 62
 1210 READ D%,time
 1220 PROChit
 1230 TIME=0:REPEAT UNTIL TIME=time
 1240 NEXT W%
 1250 VDU19,6,6,0;0;
 1260 PROCthree("WELL DONE",335,900,5,7)
 1270 *FX15,0
 1280 A$=GET$:VDU28,0,5,18,2,12,26
```

This is one of hundreds of programs now available FREE for downloading on MicroLink

Turn to Page 132 ▶



10 = 0 0	310 = B862 1	610 = ED0F F
20 = 0 0	320 = 5A35 6	620 = 9445 0
30 = 0 0	330 = C81E 5	630 = 63A1 3
40 = 0 0	340 = 1127 A	640 = ED0F F
50 = 506A A	350 = ED0F 2	650 = 2F29 F
60 = FF09 D	360 = 431B D	660 = 21CA B
70 = 3D7A D	370 = 2462 E	670 = 91DA 1
80 = 635C D	380 = 9B0D F	680 = 2F4E 0
90 = E5F7 2	390 = E760 1	690 = 870D B
100 = F1C E	400 = ED0F 1	700 = 5EB6 5
110 = 6692 2	410 = 7905 3	710 = 4FEE 9
120 = F7AD A	420 = 6D0F 2	720 = 43DB 9
130 = 9438 1	430 = B299 3	730 = 45DC E
140 = 88FA 0	440 = 6108 7	740 = D84 5
150 = 5018 D	450 = B7C4 9	750 = 274 8
160 = 672 1	460 = 8A44 A	760 = BA64 A
170 = BCE2 8	470 = F968 D	770 = CA9D F
180 = BE97 2	480 = A041 8	780 = ED0F C
190 = 7628 3	490 = BF29 E	790 = 363B 4
200 = 9374 F	500 = D468 8	800 = 3802 F
210 = ED0F C	510 = E091 A	810 = 7EBA 9
220 = 5A41 5	520 = D1F F	820 = 8383 C
230 = 6271 4	530 = F985 B	830 = 7A9C 1
240 = 1238 C	540 = A13E 6	840 = 656A 7
250 = 5891 F	550 = AF52 1	850 = 1A07 1
260 = 579A 5	560 = E178 4	860 = 68EA C
270 = 9A52 2	570 = D845 2	870 = B8B7 7
280 = ABB1 6	580 = BB14 9	880 = ED0F 5
290 = 399A 5	590 = 40E8 C	890 = 8DE6 C
300 = B34 2	600 = 1FD2 4	900 = 4B79 2

910 = ED0F 0	1210 = 67F2 C	1510 = 6008 0
920 = DBEB 9	1220 = CF4E F	1520 = EFA3 E
930 = CE6E 7	1230 = 5428 5	1530 = D8F4 6
940 = ED0F 9	1240 = D845 2	1540 = 9728 1
950 = 0 9	1250 = F7BD D	1550 = C169 9
960 = 74FA 5	1260 = 4E76 1	1560 = BD53 2
970 = 0 5	1270 = 6C86 C	1570 = CA6D A
980 = CECE D	1280 = 3734 4	1580 = 45C1 7
990 = 0 D	1290 = ED0F A	1590 = A0EE 2
1000 = 3BD3 2	1300 = 6087 F	1600 = D845 F
1010 = 0 2	1310 = 4FA2 2	1610 = 4752 8
1020 = BC3A E	1320 = 1447 0	1620 = 2A6D E
1030 = 0 E	1330 = 6031 8	1630 = 84B1 C
1040 = A370 B	1340 = A1F4 E	1640 = B0F A
1050 = 0 B	1350 = EE75 4	1650 = 5801 8
1060 = 49CB D	1360 = 6F25 A	1660 = 9E32 0
1070 = 67EB 1	1370 = 427A 3	1670 = EECA 5
1080 = 0 1	1380 = A4C1 5	1680 = 2610 C
1090 = CBB4 2	1390 = 3A62 9	1690 = 29BC 6
1100 = 7A96 6	1400 = 4DC1 6	1700 = EA77 3
1110 = 0 6	1410 = 8AB1 3	1710 = F5B1 7
1120 = D50D D	1420 = F819 7	1720 = 2BF0 7
1130 = 785A 5	1430 = 7CA7 E	1730 = B330 B
1140 = 180F 9	1440 = 77F2 5	1740 = 3FA9 4
1150 = ED0F E	1450 = 427A 6	1750 = 94AF 0
1160 = 3660 5	1460 = A4C1 D	1760 = DD92 B
1170 = B8E4 F	1470 = 3A62 A	1770 = 889C F
1180 = 78BD 3	1480 = 52AB 2	1780 = 6C22 9
1190 = D869 0	1490 = 8AB1 2	1790 = 200B A
1200 = 3241 4	1500 = D845 1	

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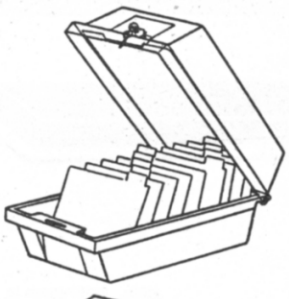

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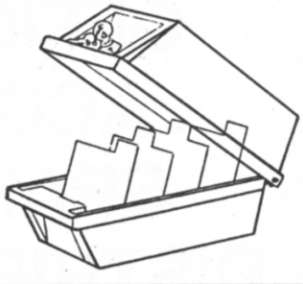

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◀ *From Page 130*

```
1290 ENDPROC
1300 DEFPROCthree(M$,X,Y,B,G)
1310 VDU5,18,0,G
1320 MOVEX,Y:PRINTM$
1330 VDU18,0,B
1340 MOVEX+10,Y-4:PRINTM$
1350 VDU4,23,1,0;0;0;0;:ENDPROC
1360 DEFPROCshow
1370 RESTORE1510
1380 FOR W%=1 TO 9
1390 READ K$,U%,I%,L%
1400 COLOUR L%+128:COLOUR1
1410 PRINTTAB(U%,I%);K$;
1420 NEXT W%:COLOUR128:PRINTTAB(1,2);"Q
-Quit";
1430 *FX15,1
1440 A$=GET$
1450 RESTORE1510
1460 FOR W%=1 TO 9
1470 READ K$,U%,I%,L%
1480 COLOUR L%+128:COLOUR1%
1490 PRINTTAB(U%,I%);K$;
1500 NEXT W%
1510 DATA "Spce",8,23,7,"?",10,17,8,"Z"
,6,15,9,"X",9,13,10,"C",13,15,11,"V",14,
20,12,"B",15,8,13,"A",4,11,14,"S",6,8,15
1520 VDU17,128,28,0,5,13,2,12,26:ENDPRO
C
1530 DEFPROCinst
1540 RESTORE1620
1550 VDU17,132,12
1560 FOR W%=1 TO 35
1570 READ M$,X,Y,V
1580 PROCthree(M$,X,Y,V,0)
1590 IF W%=18 THEN A$=GET$:CLS
1600 NEXT W%
1610 A$=GET$:IF A$=" "THEN ENDPROC ELSE
GOTO1610
1620 DATA "THUNDER KING",250,1000,3
1630 DATA "After the drum kit",64,900,7
,"is drawn (takes",160,850,7,"about 47 s
ecs)",192,800,7,"There is a choice",96,7
50,7,"of :",96,700,7,"Game 1",352,650,6,
"Game 2",352,600,6,"Practice",352,550,6
1640 DATA "Game 1",64,450,3
1650 DATA "The computer will",100,400,7
,"play a series of",100,350,7,"drum stri
kes and",100,300,7,"you must repeat",100
,250,7,"this sequence to",100,200,7,"pro
gress. Each",100,150,7,"time a new note"
,100,100,7,"is added.",100,50,7
1660 DATA "THUNDER DRUMS",250,1000,3
1670 DATA "Game 2",64,900,3
1680 DATA "This is a more",100,850,7,"d
ifficult version",100,800,7,"of Game 1.
As the",100,750,7,"notes are played,",10
0,700,7,"the drum heads do",100,650,7,"n
ot light up.",100,600,7
1690 DATA "Both games are won",64,500,6
,"when 30 notes have",64,450,6,"been rep
eated",64,400,6,"correctly.",64,350,6
1700 DATA "Practice",64,250,3,"This cho
ice shows",100,200,7,"the keys & allows"
,100,150,7,"free practice.",100,100,7,"P
RESS SPACE",250,50,3
1710 DEF PROCreloc(Q%):CLS:*TAPE
1720 P%=PAGE:IF P%<=Q% ENDPROC
1730 L%=TOP-P%:PRINTCHR$129CHR$136"Relo
cating...";
1740 FOR M%=0 TO L%-1 STEP 4
1750 Q%!M%=P%!M%:SOUND17,-4,255*M%/L%,1
1760 NEXT:PAGE=Q%:A%=138:X%=0:*FX15
1770 $&100="OLD"+CHR$13+"RUN"+CHR$6+CHR
$13
1780 FOR L%=&100 TO &108:Y%=?L%
1790 Z%=USR&FFF4:NEXT:VDU21:END
```

This listing is included in this month's tape & disc offer. See order form on Page 141.

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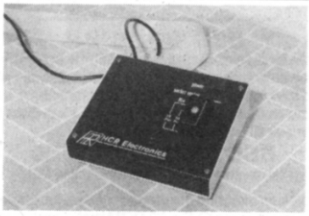

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LETTERS

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Easier underlining

ALTHOUGH I am very happy with InterWord I have found underlining text can be time consuming. I normally underline as I type rather than doing it afterwards.

This usually involves a tedious process of placing a marker at the position of the first letter of the section to be underlined, another marker immediately after the section, then moving back into the section, pressing Shift+f4 and then moving forward again ready to continue typing.

It struck me that it should be easy to set up a function key to help with this. However, the InterWord manual is not very helpful here as it does not list the relevant codes. The supplement provided with my manual does list most of the codes but not those for Shift+function keys or for Control+function keys. I have worked out these codes to be the following:

Shift+f4	↑!↑D	Ctrl+f3	↑!↑S
Shift+f5	↑!↑E	Ctrl+f4	↑!↑T
Shift+f6	↑!↑F	Ctrl+f5	↑!↑U
Shift+f7	↑!↑G	Ctrl+f6	↑!↑V
		Ctrl+f7	↑!↑W
Ctrl+f1	↑!↑Q	Ctrl+f8	↑!↑X
Ctrl+f2	↑!↑R	Ctrl+f9	↑!↑Y

I now use the following key definition to make underlining easier:

```
*K.4 ↑!#↑!,↑!↑D↑!-
```

Using this the sequence is simply to put in the first marker, type the section and press Control+Shift+f4.

Here are a few other simple ideas for making use of the function keys in Interword.

To set up f0 to underline the word at the cursor use:

```
*K.0 ↑Z↑!↑D
```

and

```
*K.1 ↑Z↑!↑E
```

sets up f1 to embolden the word at the cursor.

These two can be extended to underline or embolden the word just typed by moving the cursor back a space, underlining or emboldening and then moving the cursor forward a space ready for further typing:

```
*K.2 ↑!,↑Z↑!↑D↑!-
*K.3 ↑!,↑Z↑!↑E↑!-
```

If you want to increase the column width you can have:

```
*K.5 ↑!↑Q↑!-↑{{{Q}
```

and to decrease column width you can use:

```
*K.6 ↑!↑Q↑!,↑[
```

or you could just cycle through the width using f5. You can change the whole page layout with a function key:

```
*K.7 ↑!↑T↑M↑M72↑M4↑M4↑M↑M7
0↑[
```

This example gives a page of 72 lines, a top space of 4, a bottom space of 4 and puts the footer on line 70. And to return to the default setting:

```
*K.8 ↑↑↑T↑M↑M66↑M6↑M6↑M↑M6
3↑[
```

I use a dot matrix printer at home and a daisy wheel at work. The key definition below, used from the main menu (you just press the key and not Shift+Ctrl as well), sets up InterWord for the daisy wheel.

Assuming that InterWord starts with the default settings and pause between pages set to off, this definition will change it for use with a 1200 baud serial printer, line feeds on and pause between page set on.

It also loads in the appropriate control codes which have been previously saved as codes1. Note that the X in the middle of the definition is deliberate to skip the Press any key prompt.

Obviously another key can be used to change the set-up back to that appropriate for another printer if needed.

Because of the power of InterWord it is less necessary to define function keys than it is with other word processors but useful savings of time can still be made as I hope the above examples indicate. I'd be very interested to see other people's ideas. — **Mick Gregson, Nottingham.**

Faster checksums

PAGE 119 of the August issue of The Micro User *has a very useful name and address program. You state that, once typed in, you can check it using checksums.*

I must have missed the issue that gives details of how this is done and the program used. I would appreciate it very much if you could give me some help. — **E.H.D. Jones, Ashford, Kent.**

● The checksum program and full details of how to use it are given in the June issue of *The Micro User*. There were some other alterations and improvements in the Letters section of the September issue.

On this month's magazine disc is a machine code version of the checksum program which operates much faster than the original.

PTR# "bug" in Basic II

DURING the last few months while writing a Basic family of programs I have noticed what I am sure is a bug concerning the file PTR# command in Basic II.

It is said that in the use of an IF THEN statement it is optional as to whether the THEN is included, but if you need to use the PTR# command in an IF — THEN statement as in the example below, the line will not function properly unless the THEN part of the statement is included:

```
IF PTR#file%=0 PTR#file%=PTR
#file%+10
```

This will not work, and generates a syntax error, but:

```
IF PTR#file%=0 THEN PTR#fil
e%=PTR#file%+10
```

will work. Also if you have a line that has only the first of the three PTR# commands similar to the example, it should work without any problems:

```
IF PTR#file%=20 THEN REM do
 something else
```

or

```
IF PTR#file%=20 REM do some
thing else
```

*will both work. If you have any such statement such as the first or second examples in your Basic programs and then use the *CRUNCH command in Beebugsoft's Toolkit+, be sure to re-insert the THENs where appropriate, as it will remove them, thus crashing your programs for seemingly no reason.* — ***Patrick Thornberry, Taunton, Somerset.***

● This is not strictly speaking a bug, but a feature of how Basic tokenises lines.

The PTR# keyword has two

Turn to Page 136 ▶

Win a tenner

● **Want to write to The Micro User? The address is: Letters, The Micro User, Europa House, 68 Chester Road, Hazel Grove, Stockport SK7 5NY.**

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LETTERS

◀ *From Page 135*

tokens, one for when it's on the left hand side of an assignment and one for the right hand side.

When Basic is tokenising an IF statement and it comes across the PTR# without the THEN it still thinks it is evaluating the IF condition and so tokenises it using the right hand side token.

This results in an error when the program is run.

Kick your way through

I HAVE completed all the screens in Yie ar Kung Fu II, and here are some hints for tackling it:

To kill Yen-Pei, which is not difficult, just throw normal punches. Lang-Fang is killed by jumping at her if you can. Keep on using ankle punches.

Pochin is quite easy, just jump at him and do a high kick. Wen-hu is quite hard really but just use ankle punches again.

Wei-chin, who throws a boomerang, is not too hard to beat. Jump at her then punch each time she throws a boomerang. Mei-lang, who throws knives, is easy sometimes. Again jump at her then do ankle kicks.

Han-Chen throws bombs and is not as easy as he appears, try to get near him, then do ankle kicks. Lastly, Lei-jein, is, I think, the easiest of all. Dodge the lightning and when you get near him do ankle or hook punches before he disappears.

The way to get past the midgets is to jump round them. After that the game goes back to the beginning, but gets faster.

If some of these tips don't work and you start to run short of energy press T and you get a new supply (cheating really). — **A.S. Shakoor, Ilford, Essex.**

Master 128 harbours a bug

I WOULD like to draw your attention to a bug I have found on my Master 128. The problem arises when the following is entered, which is legal with HIMEM set at its default value:

```
DIM A%(255,255)
```

Following a short delay, the screen clears and the cursor does not reappear, although the machine will accept some input (only about 10 characters) after which it freezes and a Control+Break is needed to regain control. — **Stephen J. Allinson, Bardsey, W. Yorkshire.**

● This one really is a bug. Basic allocates and sets up the array before checking whether it has the space. If you use the value 254 Basic recognises the error and reports it, but anything greater than 255 is accepted without error and doesn't crash the machine (and we were not using an Archimedes).

However, in the case of values greater than 255 the entire memory map becomes part of the array and reading from the higher elements of the array returns the machine code values from the roms.

Vertical tabbing LX80

THE attached test program demonstrates the results of vertical tabbing on the Epson LX80 printer.

Unfortunately for Y=10 or X-Y=1, a form feed is inserted before the third string is printed. Is this a program error or a bug?

```
  10 REPEAT INPUT X,Y
  20 A$="Line 0"
  30 B$="Line "+STR$(X)
  40 C$="Line "+STR$(Y)
  50 *FX3,10
  60 VDU 27,64:REM Init
  70 VDU 27,66,X,Y,0
  80 REM ^ Set tabs ^
  90 PRINT A$:VDU 11
 100 PRINT B$:VDU 11
 110 PRINT C$:VDU 13,13
 120 *FX3,4
 130 UNTIL FALSE
```

— **Alan W. Grey, Ravenshead, Notts.**

● This is odd, and definitely a fault with the printer. Can a reader shed any light, and does it apply to other printers?

Telling the printer

I HAVE recently bought a DMP 3000 dot matrix printer and, although I can get it to print ordinary letters satisfactorily, I have found that all the computer-controlled instructions included in the user manual are incompatible with BBC Basic, being intended for another form of Basic.

A typical command takes the form:

```
LPRINT CHR$(27) + "x" + CHR$(1)
```

to select NLQ. Also included with every function is a shortened version, such as ESC x SOH. I was wondering how to convert these instruc-

£10 **Prize letter**

Speedy pair of games

SEEING Huw Woolley's 10 minute game in the July edition of The Micro User *reminded me of two programs I've written.*

In Shoot you have one minute to shoot as many creatures as you can. Each hit scores 10 points, but a miss deducts a point from your score. As your score increases, the creatures become more and more restless.

The random motion is determined by RND(100) in line 20. Increasing the value makes the game easier. The keys to use are Z, X and Return.

In Caterpillar you have to guide an ever-lengthening caterpillar around the screen without colliding with anything. It's harder than it sounds because the screen scrolls in eight directions.

And just to complicate matters, you are not allowed to travel in a straight line for very long. The beep changes tone just before you must change course.

The maximum length of the straight path is determined by C%>20 in line 50. If this check were not included it would be possible to keep going left or right indefinitely because of the way the screen lines wrap around. The warning signal is given by C%>16 in line 40.

```
   10 VDU&FF17;&3C42;&7E54;
&BDE7;&8181;&FE17;&1010;&38
38;&3838;&9254;:@%=4:REPEAT
MODE1:S=0:VDU23,1;0;0;0;0;1
9,2,12;0;:COLOUR-3:PRINTSPC
5"Score:"SPC12"Time:"SPC12T
AB(0,30)SPC40;:T=20:M=T:GCO
L3,2:TIME=-6000:J=32
   20 REPEATM=M+(M<38)*INKE
Y-67-(M>0)*INKEY-98:IFRND(1
00)<S T=T+RND(2)*2-3:IFT<0T
=0 ELSE IFT>38T=38
   30 COLOUR-4:VDU31T,2J,-1
J,31M,28J,-2J:IFINKEY-74MOV
EM*J+44,128:PLOT17,0,832:SO
UND&11,-15,150,1:S=S+(S>0):
PLOT17,0,-832:IFT=M SOUND&1
0,-10,4,5:VDU31T,2J,J,J:T=R
ND(38):S=S+11
   40 COLOUR-3:PRINTTAB(12,
0)S TAB(29,0)ABSTIME DIV100
:UNTILTIME>0:COLOUR2:PRINTT
AB(12,15)"You scored ";S:RE
PEATUNTILINKEY-99:UNTILFALS
E
```

Listing I: Shoot

The keys for this game are Z X] and Shift (you can go diagonally by pressing two keys at once). — **R.M. O'Leary, Morriston, Swansea.**

```
   10 DIMF%2562:REPEATMODE1
:GCOL0,2:FORZ%=1TO300:PLOT6
9,RND(1279),RND(1023):NEXT:
S%=&3000:X%=0:Y%=640:N%=0:O
%=0:C%=0:T%=0:E%=0:TIME=0:R
EPEATA%=16*(INKEY-98-INKEY-
67):B%=640*(INKEY-89-INKEY-
1):IF(A%ORB%)IF(A%<>X%ORB%<
>Y%)X%=A%:Y%=B%:C%=0
   20 S%=&3000+(S%+X%+Y%+&2
000)MOD&5000:*FX19
   30 VDU23;12S%DIV2048;0;0
;0;23;13S%MOD2048DIV8;0;0;0
:M%=&3000+(S%+&46C0)MOD&500
0:E%=?M%AND15:!M%=&F070701:
M%!4=&107070F:M%!8=&F0E0E08
:M%!12=&80E0E0F
   40 IFTIME<T%A%=F%!O%AND&
FFFF:O%=(O%+2)MOD2560:!A%=0
:A%!4=0:A%!8=0:A%!12=0:ELSE
T%=T%+20:SOUND1,-8,C%>16,1:
C%=C%+1
   50 FX!N%=M%:N%=(N%+2)MOD
2560:UNTILE%ORC%>20:SOUND0,
-15,4,5:CLS:PRINTTAB(10,5)"
You lasted ";TIME DIV100" s
econds":REPEATUNTILINKEY-99
:UNTILFALSE
```

Listing II: Caterpillar

LETTERS

tions for my micro.

Also how it is possible to use Mini Office II with mail merge using database files? I have tried the embedded commands:

```
GD"filename" FL1
```

but this does not seem to work. Please advise me. — **William Rayner, Huddersfield, West Yorkshire.**

● It is very simple to convert the printer commands to your BBC Micro. Taking your example from above, you can just use the VDU command from Basic:

```
VDU 27,ASC"x",1
```

From a word processor you need embedded commands:

```
CC 27,120,1
```

for Mini Office II and replace the CC with OC for Wordwise. The value 120 is the Ascii value of the letter x. You can find out other Ascii values by using Basic:

```
PRINT ASC("x")
```

A full explanation of the mail merge facility of Mini Office II was given in the October 1986 issue of *The Micro User.*

Ribbons for T shirts

I UNDERSTAND from a friend that a few months ago you reviewed a printer ribbon which enabled designs to be printed on T shirts. I have spent some time looking through your back issues but cannot find a reference to it.

I would therefore be very grateful if you could tell me the phone number of the company which markets the ribbons. — **Graham Lake, Woodford Green, Essex.**

● The ribbons are available from MGA Microsystems, 05806 4278.

Automatic rejection

I USE the disc version of View 2.1 and find it an excellent word processor for my purposes, with the exception of one feature I cannot control, the page eject.

If I type a paragraph of text in and proceed to test print it, the page ejects every time. Can page eject be cancelled in View 2.1 or do I need an upgraded version of View. — **R. Dean, Loughborough, Leics.**

● Other readers have complained about this. Any solutions?

£10 Prize letter

Functions finder

I HAVE spent many hours tracking down procedures in various programs such as those on the Welcome disc.

I therefore decided to write a program that would search through a listing, picking out all the functions and procedure definitions, listing the line number and name as it searched.

First load a program with functions and procedures in, then add the search program to the end so that you can test it to make sure it works.

```
32000 DEF PROCLDEF:P%=PAGE:
K%=0
32010 REPEAT P%=P%+K%
32020 IF P%?0<>13 PRINT"Bad
 program":ENDPROC
32030 IF P%?1=255 UNTIL TRU
E:ENDPROC
32040 L%=P%?1*256+P%?2:K%=P
%?3:J%=4
32050 IF J%<K% IF P%?J%=32
REPEATJ%=J%+1:UNTILP%?J%<>3
2 OR J%=K%
32060 IF J%=K% OR P%?J%<>&D
D UNTIL FALSE
32070 PRINTL%" DEF ";:J%=J%
+1
32080 IF P%?J%=32 REPEATJ%=
J%+1:UNTIL P%?J%<>32 OR J%=
K%
32090 IF J%=K% UNTIL FALSE
32100 IF P%?J%=&A4 PRINT"FN
";
32110 IF P%?J%=&F2 PRINT"PR
OC ";
32120 Q%=0:REPEATJ%=J%+1:B%
=P%?J%
32130 IF B%=13 OR B%=ASC":"
 OR B%=ASC"=" Q%=-1:ELSEVDU
P%?J%
32140 UNTILJ%=K%ORQ%:PRINT:
UNTILFALSE
```

When you have entered the search program you can test it by entering:

```
PROCLDEF
```

To save it first delete all the lines below line 32000 and then save it with:

```
SAVE"FP-SRCH"
```

To put it to use, load in a program to search through, find TOP less 2 (using PRINT -TOP-2) and then enter:

```
*LOAD FP-SRCH (top less 2)
```

followed by:

```
PROCLDEF
```

— **David Hill, Lechlade, Glos.**

Design a super game

MY friend and I love designing games. All the preliminary steps in making up games like plotting maps, characters and game background are all fun — but we cannot program them.

This is where I hope you will be able to help. I wonder if you could have a Game Design competition in which people could write in with designs of games with the winning design being picked by Hac-man. Then you could have a competition for people to write the game. — **Paul Tatham & Anton Howarth.**

● We think this is a great idea so come on you arcade games designers send us your unwritten games to *Game Design Competition, The Micro User, Europa House, 68 Chester Road, Hazel Grove, Stockport SK7 5NY.*

Make sure you include as much detail as possible about the plot, the characters, the screen design and so on — but remember it's for a BBC Micro with 32k ram, not an Archimedes 410!

Turn to Page 138 ►

Address Book

I HATE to sound ungrateful (because I'm not) but a couple of things need mentioning which didn't come out in my Address Book article in the August issue of The Micro User.

The label-printing and Ascii-spooling routine in PROCprs (lines 1330-1440 in Addrbk) relies entirely on the first nine fields being:

Field	Description
1	Name
2	a birthday or other non address item
3	Address line 1
4	Address line 2
5	Address line 3
6	Town
7	County
8	Post code
9	Country

Otherwise some mighty odd address labels are going to be printed. Field 2 was designed that way to allow a birthday search at the beginning of each month to print out a set of labels for the whole month, with the date in the month appearing at the right-hand end of the same line (cunning, eh?).

The post code appears after field 5, offset from the county name if given. This is shown in this sample label:

Lorna Goatly
3 Ribley Avenue
Apple Green
MAIDENHEAD
Berks.

A way out of the straitjacket is this short fix to replace lines 1350-1400

```
 1350 L=0:INPUT#X,dummy%
 1360 REM Replace 'number'
with the number of address
fields, including name
 1370 FOR X%=1 TO number
 1380 INPUT#X,u$
 1390 u$=FNtrim(u$)
 1400 IF u$="NEXTELSEPROCp
(u$+CHR$13):L=l+1:NEXT
```

I have tried this and it works. The only restriction on screen design is that you will have to use field 1 for name and fields 2 to number *for the address.*

By the way, when you get the Empty record? not saved message it is only because the cursor is in an empty window and the program is protecting you from adding blank records which cannot then be deleted. — **Bruce Goatly, London.**

LETTERS

◀ From Page 137

Spreadsheet with Pagemaker

AS an owner of a BBC B, an AMX Mouse and Pagemaker and also your highly acclaimed Mini Office II, I feel I should let you know that the spreadsheet program will not work with the Pagemaker roms installed.

The frustrating Basic I or II missing message always appears when trying to load the spreadsheet module. If I owned a Master this would be no great problem because I could simply *UNPLUG the offending Rom. However as I have no unplug command may I suggest the following poke:

```
?&2AX=0
```

Where X=the number of the rom socket+1, for example ?&2AF=0 (would disable the rom in socket E).

This works fine until you press Break and since you have to !BOOT up the Mini Office II disc I have written this short program which you run instead of booting the disc:

```
   10 ?&2AX=0
   20 PRINT"INSERT MINI O
FFICE II disc now and pre
ss SPACE"
   30 REPEAT UNTIL GET=32
   40 *RUN !BOOT
```

I hope this will be of some use to anyone else in a similar situation. Thanks for an excellent magazine. — **Andrew Westthorp, Lanchester, Durham.**

One view to many

I AM the proud owner of a BBC model B series 7 micro with a 0.9 DFS and a 1.2 operating system with View 2.1, I have just purchased Viewsheet and Viewstore. I opened the computer to fit them, only to find that I have no sockets to fit Viewstore without removing one of the others.

The children need Basic for their games, my wife needs View for writing and I would like to use Viewsheet and Viewstore and interchange files between all the View programs. Is there a cheap solution, as I have already spent too much at the moment?

I also have a further problem in that Viewstore suggests that a 1.2 or later DFS is desirable. Please could you tell me what effect having a 0.9 DFS will have? — **Bob Ridout, Haslingfield, Cambridge.**

● Your only solution is to buy a sideways rom board. There are plenty on the market. Select one which adds a few rom sockets – you won't need extras like sideways ram or a clock.

As for the Viewstore problem, we recommend that you get a DFS 1.2 otherwise you can't be sure what will work.

ALL programs printed in this magazine are exact reproduction of listings taken from running programs which have been thoroughly tested.

However, on the rare occasions when mistakes occur corrections are published as a matter of urgency. Should you encounter error messages when you type in a program, they will almost certainly be the result of your own typing mistakes.

Unfortunately we can no longer answer personal programming queries concerning these mistakes. Of course letters about suggested errors will be investigated without delay, but any replies found necessary will only appear in the mail pages.

Treat for the Elite

HERE is a little treat for all those who have a copy of Tube Elite: Take your copy and boot it so that either the Cobra Mk III or the Asp Mk II is rotating on the title screen and leave it for two to three minutes and see what happens.

As far as I know this does not occur on the Master or the original copies of Elite. Fascinating isn't it? — **M.A. Overthrow, Harlow, Essex.**

Insuring equipment

PLEASE can you tell me how much my equipment is worth: A new Taxan Supervision II monitor, new AMX mouse with MAX, BBC Master Turbo, which is six months old and a dual 40/80 Mitsubishi disc drive including psu, also fairly new.

I would like to insure my kit against damage or theft. — **G. H. Lyons, Northwood, Middx.**

● You should always insure equipment at replacement value, that is how much it would cost to replace the unit. So typical prices are:

```
Taxan Supervision II £269
AMX Mouse & MAX      £ 55
Master Turbo         £493
Twin drives with PSU £204
```

That's a grand total of £1021. On the second hand market you could get between £600 and £700 for the full set.

Speeding up View programs

I OWN a Master 128 and do a lot of my own programming, normally straight into Basic, but after reading The Basic Process by Will Gallagher in the July edition of The Micro User I thought I would try programming in View.

After a few hours I decided that it was too slow, in that you have to WRITE the program to disc then do *Basic followed by *<filename> and finally RUN just to test it, which I like to do every so often.

Then you have to write down the errors, re-enter View, READ in the file and make the changes, which is a very long process for something as simple as changing the position of a character on the screen.

My method is to start in the word processor and write the program and when I want to test it WRITE it to disc then *BASIC followed by *<filename> and finally RUN as in the normal process to spot the errors.

I then edit the program in Basic followed by *SPOOL <filename>, LIST, *SPOOL, create a file that can be READ into View in the normal way.

The program will appear with the line numbers already in place and without *BASIC or AUTO. Just put AUTO at the bottom of the program followed by the next line and *Basic at the top.

I think it speeds up the editing of small errors or changes very dramatically. — **R. Newport, Lechlade, Glos.**

No flies on this Master

I HAVE just discovered a bug in the Master's Basic rom and I am sure that your readers will be interested to hear it.

If you run this program:

```
   10 P%=&900
   20 [
   30 EQUD &6000       \eq
uate a double byte
   40 EQUW &FFFF6000  \eq
uate four bytes
   50 ]
```

the following output is produced:

```
0900 00 60 00
     00        EQUD &6000
0904 00 60     EQUW &FFFF6
000
```

instead of the expected:

```
0900 00 60     EQUD &6000
0902 00 60 FF
     FF        EQUW &FFFF6
000
```

While this bug will not affect most programs, it means that some assembler programs will not assemble correctly and so the resultant machine code will contain errors.

Finally, I like the new style of magazine, especially the new, crisper, listings. — **R.W. Orwin, Wednesbury, West Midlands.**

● We're afraid you are a bit mixed up, EQUD assembles four bytes of data and EQUW assembles two bytes – not the other way round. Basic IV on the Master is correct.

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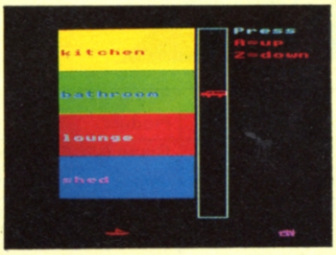

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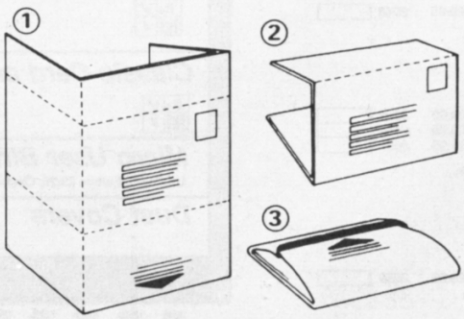

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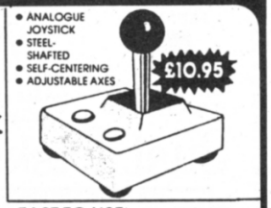

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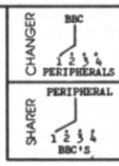

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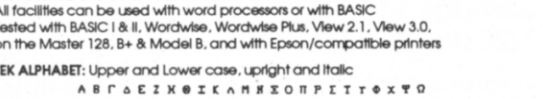

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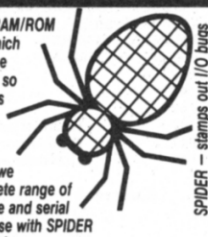

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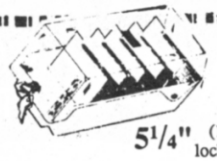

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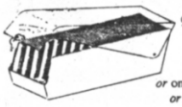

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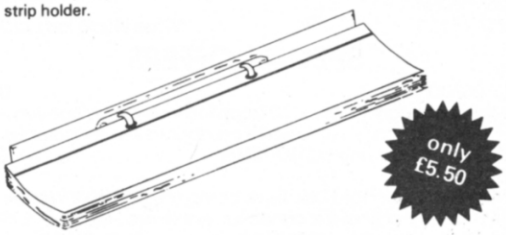

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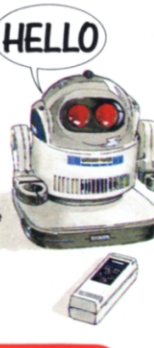

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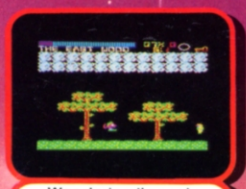

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The palace and its surrounding land is littered with magical objects and mysterious creatures. It is rumoured that there is also a hidden transporter — your only means of escape from this enchanted place.

After exploring the rooms of the palace, you should venture forth through the enclosing woodland: towards the ancient church and the eerie dungeons, or through the maze of secret passages, or over the river to the princess's house.

On your journeys, you will encounter many strange animals and people including rock monsters, gremlins, imps and guards. Some are good and some are evil. You will need to decide who you can trust to help you in this arduous quest.

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Closing Date: 30th April, 1988.

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